A Database Publication

THE MICRO USER

Volume 4
Number 12
February 1987
£1.25

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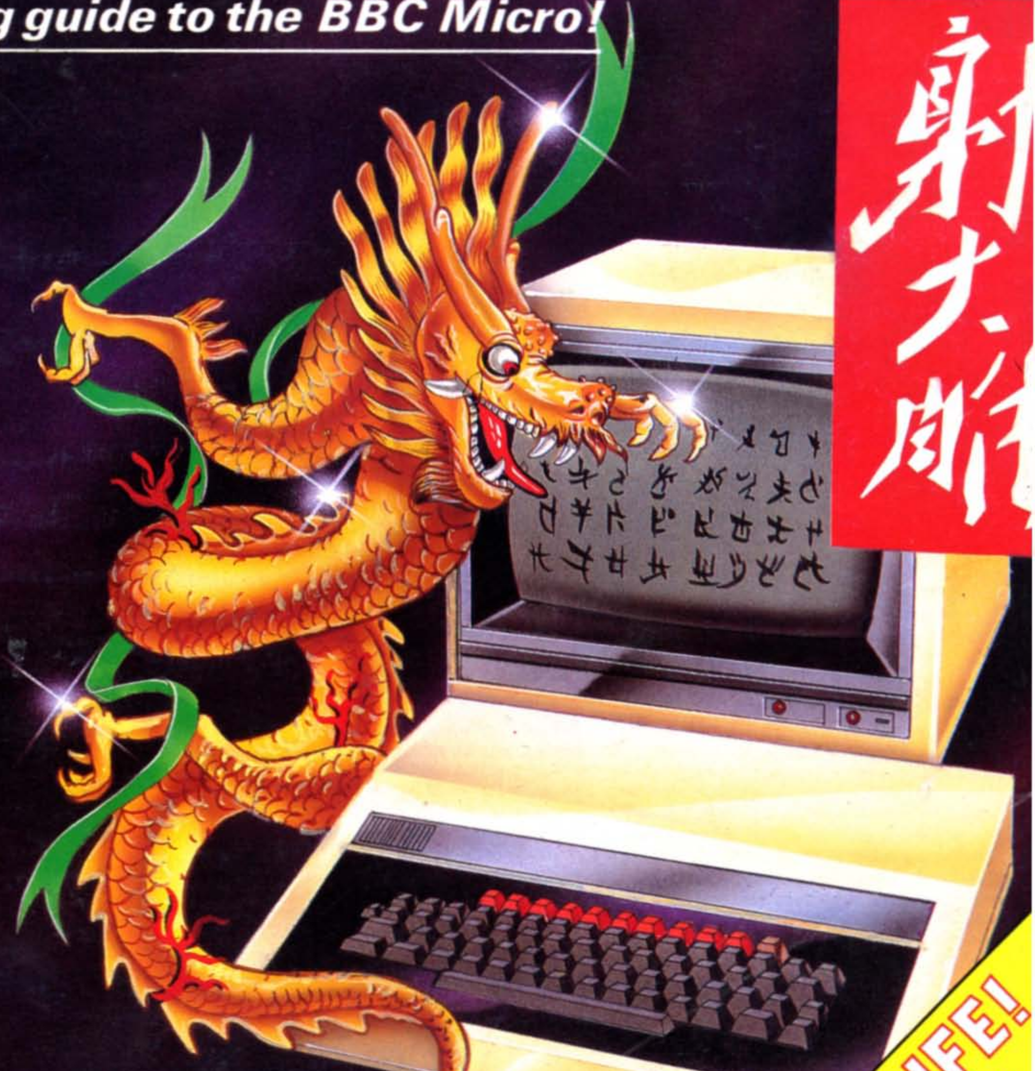
THE MICRO USER NEWS

Big breakthrough: IBM compatibility for the BBC Micro

EDUCATION MICRO USER

School networks: Are they economical, reliable – and cheap?



MICRO SOLVES CHINESE PUZZLE

Viglen hard disc reviewed

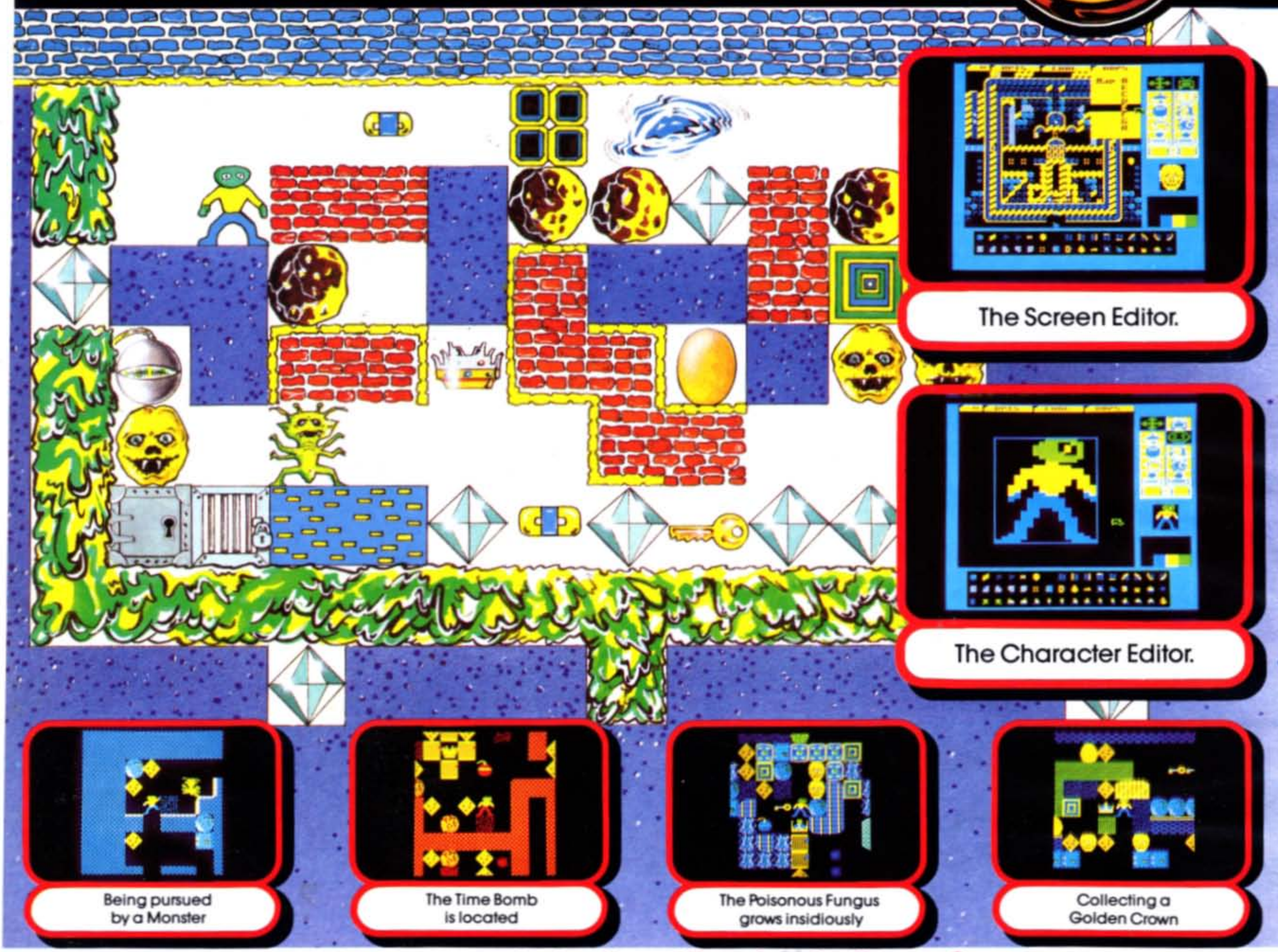
SAVE A LIFE!
Doctor's program that teaches you what to do in an emergenc

THE MICRO USER
February 1987

For the COMMODORE, AMSTRAD, BBC MICRO, ELECTRON

REPTON 3

THE ULTIMATE CHALLENGE



The Screen Editor.

The Character Editor.

Being pursued by a Monster

The Time Bomb is located

The Poisonous Fungus grows insidiously

Collecting a Golden Crown

Are you ready for the ultimate challenge?

Our original Repton game was immediately acclaimed as a refreshingly new concept: a game requiring dexterity to complete its arcade-style elements, and clear logical thinking to solve its strategic puzzles. Repton involves retrieving treasure from cleverly-constructed traps of falling rocks whilst avoiding the fearsome monsters and haunting spirits. "This is an astounding game reaching new heights in BBC arcade adventures," enthused the Micro User magazine.

Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!"

Now, completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-designer is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds . . . any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 24 fascinating screens, and players who are skilful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: a creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 4th dimension); and golden crowns as well-deserved rewards for your endeavours. **Can YOU complete Repton 3?**

PRIZE COMPETITION

If you complete Repton 3, you can enter our competition. Prizes include over £200 in cash, with T-shirts, mugs, badges and pens for runners-up.

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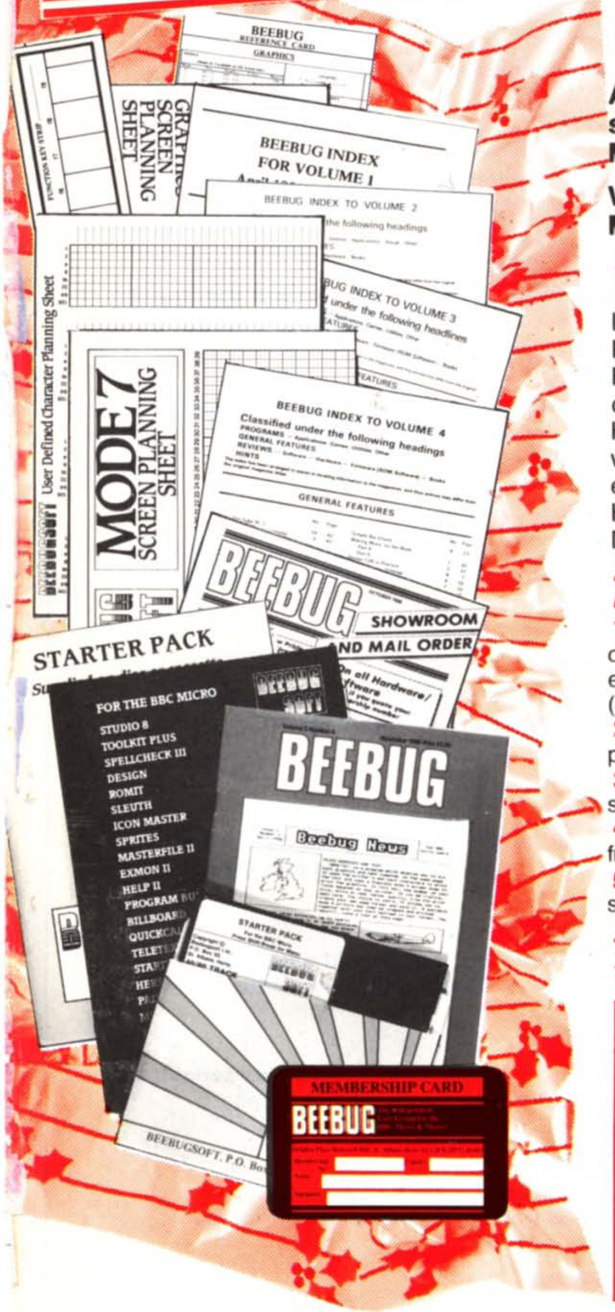
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A subscription to Beebug provides comprehensive support for anyone who is a user of the BBC Micro, Master or Compact.

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Vol. 4 No 12 February 1987

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Quoting Ref. MAG001
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Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:
£15 – UK & Eire (Sterling only)
£25 – Europe
£42 – Rest of world (airmail)

ABC 59,727
Jan-June 1986

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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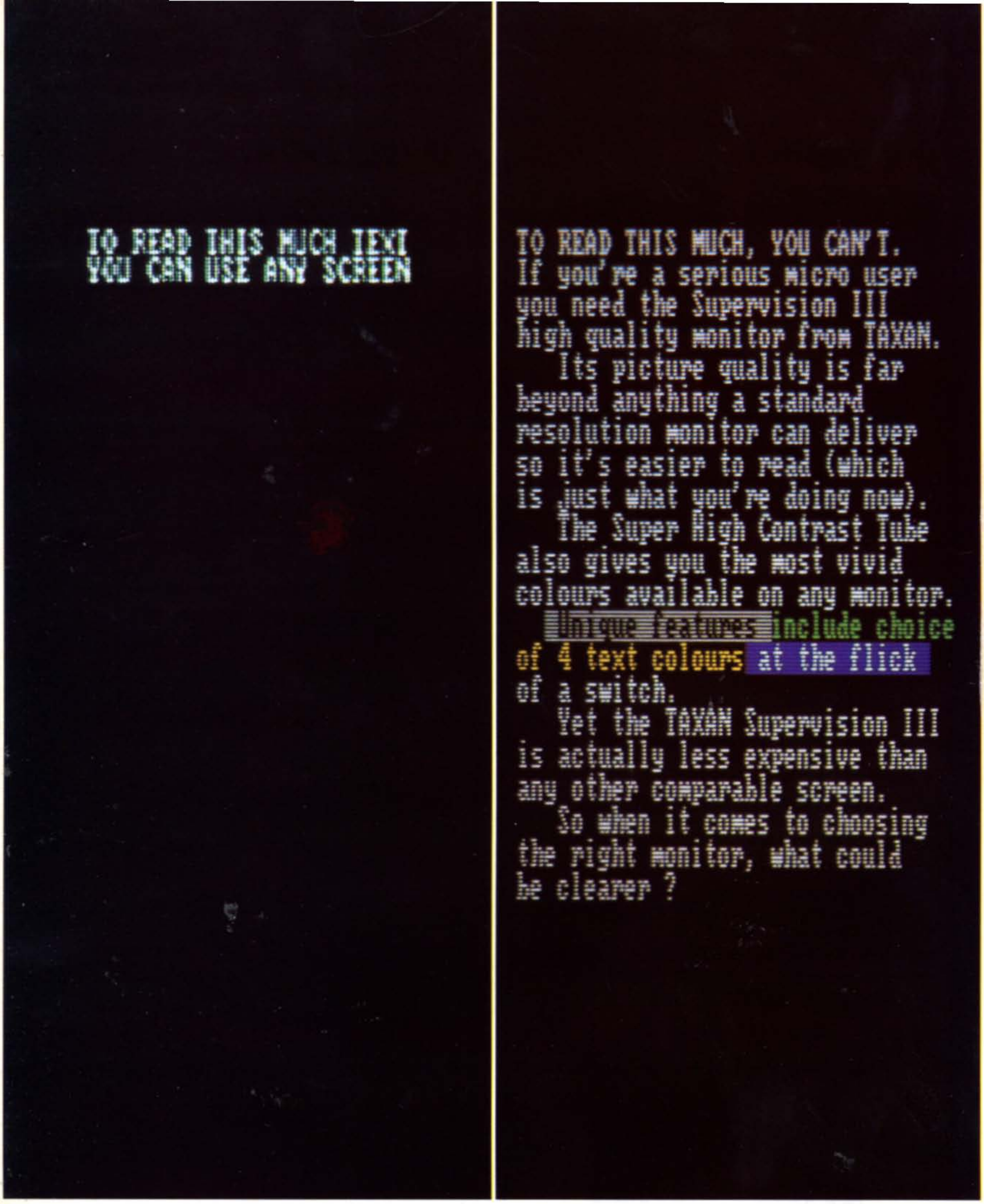

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PERFECTING THE IMAGE

Comet stocks the Master

NATIONAL electrical and gas appliance chain Comet has begun to stock the BBC Master Compact.

Staff from each Comet store are attending specially devised training sessions to learn about the machines and the wide range of software support available.

Comet director Brent Wilkinson said: "The high specification and competitive price of the Compact is going to prove extremely attractive to our customers.

"The free software is a very good introduction to the machine's versatility.

"And the sales training support that our staff receive from Acorn will mean we'll be able to provide real assistance to the customers".

Acorn sales manager Joe Black said the company's ability to respond in a flexible fashion to Comet's needs had been a crucial factor in the deal.

"The kind of training we can provide, our advertising and marketing support, and the quality of the product we're offering simply reinforces the message that Acorn is the choice of experience", he said.

IBM compatibility for the BBC Micro

A TECHNICAL breakthrough by Watford Electronics has opened up IBM PC compatibility for the BBC Micro and the B+.

The company's backroom boys have won the race – Acorn is believed to have been working on a similar project – to develop the critical hardware interface needed.

This will allow the Acorn Master 512k add-on board to be connected directly to both machines.

And it means that both the BBC Micro and the B+ can embrace the Gem environment and become capable of running hundreds of critically acclaimed packages such as Superbase 3 and dBase II.

Known as the Co-Pro Adaptor, the new interface from Watford carries a price tag of £50.

It has been launched at a critical time – shortly after Acorn announced it was to slash the price of its 512k add-on board by £200 to bring it down to £199.

The board itself provides Dos Plus which Acorn insists will translate into up to 70 per cent PC compatibility.

A rule of thumb guide is that this now means that the BBC Micro and the B+ will be capable of running virtually all PC text based programs, but not all the graphics oriented ones.

The 512k add-on unit was originally designed by Acorn to make the Master far more competitive in the face of the threat from the clones.

Now the Watford boffins have managed to take this one stage further.

"This means that for less than £250 both the BBC Micro and the B+ can be converted into serious business machines", says Nazir Jessa, Watford's managing director.

"We feel this is a far more attractive proposition than buying the cheapest of clones".

It will cost schools even less. For those buying the 512k add-on board will be eligible to claim back £23 under the DTI Software In Schools Scheme.

The Co-Pro Adaptor also offers another major benefit to both BBC Micro and B+ users.

It will allow the machines to be linked directly to the Master Turbo co-processor, and take full advantage of the extra speed and memory offered.

"As a company, we are well aware there are over 500,000 BBC Micro users out there", says Nazir Jessa.

"We have grown up with them and this latest interface is yet another demonstration of our commitment to ensure they do not get left behind".

Acorn advice on Compact

ACORN has issued advice to users who want to connect a 5.25in disc drive to their Master Compact.

Because the Compact uses 3.5in drives it is not directly possible to read 5.25in discs which may have been created on other BBC Micros.

It is possible to connect a 5.25in drive to the Compact for the purpose of transferring information between the two formats.

But Acorn warns that 5.25in discs should not be used as a means of data distribution – and only 3.5in discs are recommended for data storage on the Compact.

The 5.25in disc drive should be mains powered and of a modern type. The 1772 disc controller IC used in the Compact will not support step speeds slower than 12ms.

Some older drives take up to 30ms, and this will not be compatible with the Compact. Generally speaking, half height drives will be suitable, says Acorn.

The 5.25 drive must be configured as drive one, the method for doing this varying between makes of drive.

Generally, the drive case will need removing and a jumper moved from the position marked DS0 to the position marked DS1.

The drive must be disconnected from the mains supply before doing this.

A special cable must be made up in order to connect both 5.25in

Turn to Page 9

PLOTMATE

A Graphic Illustration

'Plotter' is too simple a word to describe PLOTMATE. It is, in effect, a highly sophisticated data communications device that greatly extends a micro system's options and capabilities allowing high resolution input and high definition output. It is compatible with all leading micros including the BBC, IBM, AMSTRAD, ATARI and NIMBUS.

PLOTMATE A3M with Linear Graphics' high resolution image scanner — LINSCAN.

NEW RELEASES

HPGL By expanding the on-board graphics language range PLOTMATE understands commands from HPGL 7475A/7470A industry standard languages enabling compatibility with BITSTICK, AUTOCAD, LOTUS 123, SUPERCALC 3, CHARTMASTER and many others.

IMAGE SCANNING PLOTMATE's flexibility is further extended by the use of Linear Graphics' own scanner, LINSCAN. This allows PLOTMATE to function as a sophisticated image scanner producing high resolution pictures that can be used within desktop publishing packages such as Pagemaker, GEM, Fleet Street Editor and Image.

EXTENDED GRAPHICS COMMANDS The in-built graphics commands of the BBC micro that PLOTMATE understands now encompass the extended graphics commands of the BBC Master such as circle and arc drawing, sector and segment filling, rectangle and parallelogram shading.

DOMESDAY All 'Welcome' disks allow data files produced by the DOMESDAY database to be output in pie, bar and line chart format on the BBC Master.

Not content with providing this wealth of technical capacity Linear Graphics have even introduced a unique discount scheme for primary and secondary schools — the 'Educational Support Scheme.'

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Toolkit enhanced

A NEW version of its Mega Rom toolkit has been released by Chalice Software for the BBC Master and Compact.

In addition to the utilities contained on the original rom, it has a number of new features.

These include a powerful disassembler displaying the new instructions available on the Master series and a memory editor providing access to all the paged/shadow ram on the Master.

Other features include formatter and utilities for users of the ADFS. Price £29.95.

TV SERIES ADAPTED

FOLLOWERS of a popular TV series can now take on the roles of their heroes in the latest release for the BBC Micro from US Gold.

Masters of the Universe challenges the user to join HeMan as he battles against the forces of evil to save Eternia. Price £7.99.

Expedition Raleigh reports success

TELEX from the scientific expedition ship Sir Walter Raleigh: "PANDORA CAY POSN 11.22.57 SOUTH 143.56.52 EAST. ARTIFACTS STARTING TO COME UP. ALL WELL. NO PROBLEMS".

Pandora Cay is where HMS Pandora, dispatched by the Admiralty to capture and bring back the Bounty mutineers, floundered on the Great Barrier Reef in 1791.

The wreck is currently being dived on by Operation Raleigh venturers between the ages of 17 and 24, assisting staff of the Queensland Museum.

The artifacts, in a remarkable state of preservation, are being catalogued as they are retrieved on one of the BBC Micros in the flagship's computer laboratory.

This is only the latest application of BBC Micros in Operation Raleigh's round-the-world adventure.

Aboard the Operation Raleigh flagship, Peta Lock and US Navy P.O. Lea Dey transmit data to Tactical HQ via BBC Micro

Most useful is the electronic mail function which is carried out using Telecom Gold through The Times Network for Schools.

This links the Sir Walter Raleigh, all the project's land bases and Operation Raleigh coordinators around the globe.

Other BBC Micros are being used with AMT-2 modems and Amtor radio teletype software for a teleprinter link between the ship and Operation Raleigh's headquarters in London.

It is proposed to set up a similar link with the amateur radio station at the project's support centre in Hull.

A Hull University postgraduate student has developed a system for storing details of all local venturers and candidates on a BBC Micro for retrieval by coordinators.

Operation Raleigh research headquarters at Leeds University is using BBC Micros linked to a mainframe to store information on each phase of the project as it takes place.

Compact discs advice

From Page 7

drives and 3.5in drives to the Compact.

This should be connected to the back of the Compact keyboard unit.

The Compact monitor stand (disc drive) should be connected to the 25-way D-type connector on the cable and the 5.25in disc drive should be connected to the 34-way connector on the cable.

Any ADFS files on 5.25in discs may now be transferred from drive one to drive zero as detailed in ADFS documentation.

However, transferring data from DFS files on 5.25in discs to the 3.5in ADFS format requires a sideways ram image of 1770 DFS to be loaded into sideways ram on the Compact.

Later editions of the Compact Welcome disc contain such an image. Either could be loaded in to sideways ram for this purpose.

Users not having either version can purchase copies of the most recent Compact Welcome discs from the service and training department at Acorn for £5 each.

Once the DFS has been loaded into sideways ram, files may be transferred using the Copyfiles utility provided on the Welcome disc.

Only the ADFS should be used on the 3.5in disc, which should never be used with the DFS, says Acorn.

BUSINESS PROGRAM OF YEAR CHOSEN

ONCE again Mini Office II has followed its predecessor – the original Mini Office package – to carry off a top award in a national publication.

It has been named as Business Program of the Year in the annual readers' poll conducted by Popular Computing Weekly.

The first Mini Office walked away with the same category in the previous year.

"It was way ahead of the rest of the field", said a spokesman for PCW. "Just as the original Mini Office was last year".

This latest accolade for the package comes only weeks after Mini Office II reached the top of the best-selling chart – a position previously held by the original Mini Office.

It made it to number one in the BBC Top Ten Software Chart published by Gallup – the only non-game program in the list.

As such it became only the second business package to achieve sales of sufficient volume to compete in the otherwise games dominated league.

The first – the original Mini Office – was launched in October 1984 and is still selling well at £5.95 on cassette, £7.95 on 5.25in disc and £9.95 on 3in disc.

Mini Office II came out in January, 1986, and costs £14.95 on cassette, £16.95 on 5.25in disc and £19.95 on 3in disc.

A rom version of Mini Office II has recently been launched by Database Software for the BBC B, B+, Master and Compact at £59.95.

Software support plan

A SUPPORT service for owners and purchasers of Datagem software has been launched by Minerva Systems.

This follows the demise of Datagem publisher Gemini Marketing last year.

The service has full backing from the program's author Barry Stern and the software will now be marketed by Minerva together with the Triple D suite of programs.

Users of the software who experience problems should contact Minerva Systems in Exeter.

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Novacad Plotter Utilities	32.78

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OPUS 5802D 800K 40/80T/DS including PSU
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This well-built printer offers many advanced features. It provides both friction and tractor feed NLQ as well as draft modes and full Epson code compatibility. This special offer includes a BBC Cable.

£179.00

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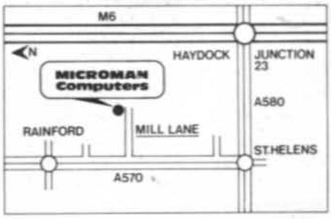
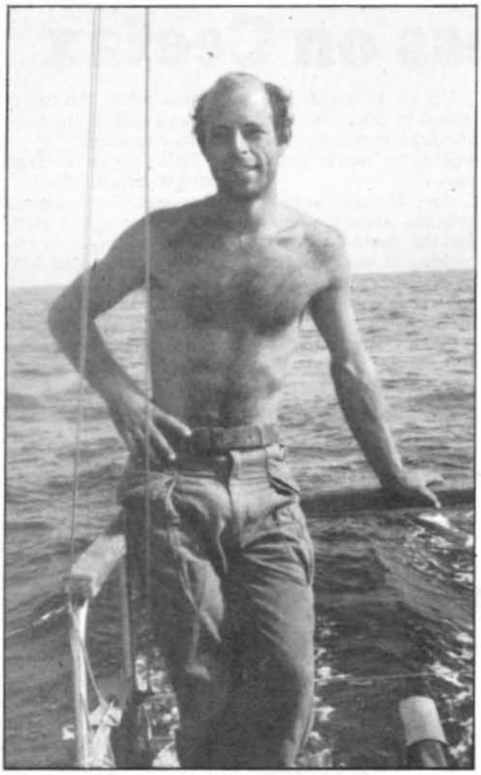
PC SHOWROOM

With the launch of the Amstrad PC1512 and Opus PC II, we are opening a new showroom for the sales of PC compatible computers, add-on card, hard discs, printers and software. The showroom is adjacent to our existing shop and we welcome our existing and new customers to visit us and have an opportunity to see and use this new range of machines and software.

We will be stocking the range of Amstrad PC1512, Opus PC II and Tandon computers along with software titles such as VP Planner, VP Info, Executive Writer, Supercalc 3, Wordstar 1512, Word Junior and many more applications.

Opening times for the showroom will be 9-5 Mon.-Fri. and 9-12 Sat. Our shop times remain unchanged.





John Pedersen . . . a micro for company

Round the world with a BBC Micro

SAILING round the world with a BBC Micro for company is 30-year-old John Pedersen.

The self-confessed Jack-of-all-trades from Tyneside is fulfilling a lifetime's ambition to go where the trade winds take him in his 30ft trimaran Chikor.

The boat will be his base on a journey with no set time limit, during which he hopes to make a living writing magazine and newspaper articles about sailing, with the micro as word processor.

Before leaving England, Pedersen told *The Micro User:* "I bought the boat four years ago for £6,000 and have put a lot of work into it since then.

"To prepare for my big journey I have been sailing all round Europe from Norway to Italy and North Africa.

"The first stage of my trip will take me down to the Canary Islands and Cape Verde Islands and then across the Atlantic to Venezuela. After that I shall play it by ear.

"I'm hoping to run the BBC Micro from batteries charged by my wind-generated on-board power supply.

"As well as writing I shall be attempting to learn programming – after all I shall have plenty of time on my hands".

COST OF INEFFICIENT DISC MANAGEMENT

INEFFICIENT disc management is costing British businesses millions of pounds a year, according to Simon Allen of micro consultants Software Support.

On average only three-quarters of every disc's capacity is used, says Allen, but what makes the situation worse is that so many have to be loaded in order to find out what's on them.

"Manufacturers' labels are hopelessly inadequate for describing the contents of discs", says Allen.

"And the standard 8-character constraint on passwords leads to cryptic filenames which, though meaningful at the time the file is created, can be extremely misleading to the user after a period of time – and to other users immediately.

"Unfortunately this means that disc-buying British companies are suffering from the Colman's Mustard syndrome whereby consumer wastage makes riches for manufacturers".

Simon Allen . . . "labels inadequate"

Allen's solution has been to develop and launch a low-cost disc manager - cum - micro user's companion for BBC Micro users as an effective means of ensuring that potential losses are kept to a minimum.

"I believe that Disc Manager is cost-efficient and well designed, versatile and user-friendly", Allen told *The Micro User.*

"And, as it measures only 5 in by 5 in, it fits into most disc storage units".

Disc Manager costs £1.85 for orders of 50 or more.

Three years ago

ANOTHER look back at what *The Micro User* covered just 36 months ago – a lifetime in the fast changing world of computers. This was the issue for February 1984.

THE MICRO USER
INSIDE!
Build your own real-time clock
12:40 55
WIN!

Acornsoft has taken legal action against Personal Computer World after the magazine published details of how to break locked programs. The action forced the publishers to settle out of court for £65,000.

* * *

A trial by computer featuring the three main political parties is called off. After news leaked out that they would be competing at the BBC Micro User Show against a five year-old whizz kid, the politicians got cold feet and declined to appear.

* * *

Watford Electronics' Z80A second processor is launched at the show and attracts a great amount of interest. Featuring a Z80A running at 4MHz with 64k of ram, the unit contains its own disc interface capable of dealing with 40/80 track discs and costs £299.

* * *

Also launched at the show is a 20k ram upgrade from Aries. The Aries-B20 gains an extra 20k of memory by switching official Acorn calls from the screen to its own on-board memory and ensures that the BBC Micro's ram is free for Basic programs.

ACORN WINS £1 MILLION ORDER

ACORN has beaten strong competition from Amstrad and Commodore to win an order from Poland for nearly £1 million worth of hardware and software.

It is believed to be the first official order from Poland for this type of equipment. The purchaser is miners' cooperative PZG in the industrial region of Katowice.

The deal involves 200 Master 128 and 1,500 Compact machines, plus dis drives and monitors.

More than 70 software titles shipped include games, junior education, graphics packages and utilities.

Polish technicians have been attending courses organised by Acorn so that they can set up servicing and maintenance facilities themselves.

Acorn is taking a stand at the Consumer Computer show in Warsaw this month and expects great interest to be shown in its products.

Current estimates are that about 250,000 micros, acquired from various unofficial sources, are already owned by Poles.

More for the Master

A NUMBER of new packages for the Master series have been released by Clares Micro Supplies.

They are all conversions of top-selling products and have been modified to work with ADFS on both the Compact and Master 128.

Fontwise Plus is now compatible with Interword and Edword2 as well as Wordwise, Wordwise Plus, View and Mini Office II. Price £20 on 5.25in disc, £22 on 3.5in disc.

Sister program Font Editor is being bundled with Fontwise Plus for £30 on 5.25in disc, £34 on 3.5in disc.

Macro assembler Macrom has been upgraded with several new features requested by users, and the support disc now contains a Hi-Macrom version for use on co-processors. Price £37 on 3.5in ADFS format.

With Ramrod, Clares has taken advantage of 65C02 codes to provide a more powerful version for the Master 128 and Compact.

It has 61 commands including Catall and Exall for use on ADFS. Rom price £40, 3.5in disc £37.

Keyword access on Ceefax

A BBC Micro program giving owners of teletext adapters instant access to any selected topic on Ceefax has been developed by BBC Telesoftware.

Previously, a page on Ceefax could only be seen by typing in one of the hundreds of page numbers.

Now all the pages dealing with a specific topic can be found by typing in a keyword. The new program, available free from BBC Telesoftware, presents all the pages from Ceefax which contain the keyword chosen.

It works by constantly scanning the Ceefax broadcasts. When it finds the given word it stores the complete page in computer memory until the user is ready to view it.

Up to 10 pages are stored at once. As they are read they are overwritten by newly found pages.

Any channel can be selected while searching for the same keyword, making it easy to find every reference to a subject from all teletext broadcasts.

As an alternative to the normal teletext display, advanced techniques allow the top or bottom half of the page to be expanded.

This gives a true double-height display, previously considered impossible on a BBC Micro, making it clearer for those with sight difficulties.

● BBC Micro teletext adapter systems feature in a special Micro User mail order offer on Page 121.

DISC IS ANSWER TO A PRAYER

A TWO-year search for database software which meets the special needs of churches has ended in success.

As a result, a BBC Micro disc program called Churchbase 2 is being marketed by the Rev Bruce Carlin, vicar of St Chad's, Stockton-on-Tees.

It marks the end of the search by the Rev Carlin, a member of the Church Computer Users Group and a BBC Micro owner for four years.

He started on his mission after trying out a cassette program produced by the stewardship department of the Diocese of Durham.

This, along with commercially-developed databases available at the time, fell short of what the Rev Carlin and many of his colleagues in the clergy were looking for.

Rev Bruce Carlin and Churchbase 2. Picture: Evening Gazette

So, nearly two years ago, he surveyed fellow members of the CCUG to find out what they were looking for in their ideal database.

The results went into development of Churchbase 1 about a year ago, written with the help of programmer Bob Francis, a Methodist Church member in Lancashire.

About 30 copies of the program were sold to members of the clergy who, in return for the promise of a nominal cost upgrade at a later date, were asked to test the software for bugs and omissions.

All their feedback has been used to help Bob Francis prepare Churchbase 2, a £30 disc package that covers all the requirements of churches and also performs as a general purpose database.

"We've succeeded in putting the best of all worlds into one program", the Rev Carlin told *The Micro User*.

"It has very sophisticated search facilities and can save any formulae.

"It features random access with up to 50 fields defined how you like, and is available in 40 or 80 track versions with a demonstration datafile too if you want it.

"You could call Churchbase 2 the answer to a prayer – it is certainly the best software specifically for church use that I have ever seen".

THE record-breaking Electron & BBC Micro User Show returns to Manchester next month for the fourth time. The Northern showcase for all that's new on the BBC Micro looks set to be an even greater success than its predecessors.

More than 10,000 enthusiasts visited the last Manchester Show, held in September, to witness the launch of the Compact and M19 machines. Organiser Database Exhibitions is confident that an even larger number will attend the coming event which has over 70 companies exhibiting and a host of new products available for owners of all the BBC machines.

The show will take place at the Renold Building, UMIST, March 20,21 and 22. Once again the Acorn Theatre will be a prominent feature of the exhibition and computer experts will be on hand to supply information on the latest products.

Package for small investor

TO SERVE the growing army of Stock Market investors with moderate means, Squirrel Software has added to its Care Utility series.

Investment Care – for the BBC Micro, Master 128 and Compact – is also for experienced investors, but it has been inspired by recent public share offers.

"The program has been written with the new breed of more modest holders of TSB, British Telecom and British Gas shares very much in mind", Squirrel managing director Alan Turner told *The Micro User*.

"It produces several statistics which should help these people decide when best to sell in order to convert their paper profits into cash".

Investment Care keeps track of unit and investment trusts, stocks and shares, producing displays of purchase and bid details for each investment.

Printouts of current holdings, sales in current tax year, dividends received are available.

Offer and bid prices are easy to enter, and the true position of the user's portfolio can be seen at a glance.

Investment Care costs £13.95 for the BBC Micro, £24.95 bundled with Cash Care, Building Society Care and Vat Care utilities for the BBC Micro, Master 128 and Compact.

MICRO MEDIA Computer Supplies

0707 52698 or 0707 50913

Dept. MU Rydal Mount, Baker Street,
Potters Bar, Herts EN6 2BP

Printer Ribbons

Mixed types for quantity breaks

	2+	5+	12+
Acorn AP 80	2.70	2.30	2.10
AP 100	2.70	2.30	2.10
Ink Jet Cartridge	7.50 per pack of four		
Brother M1009	3.50	3.00	2.80
Red Brown Blue Green	4.95	4.65	4.25
HR 15 MS	3.30	2.90	2.60
HR 15 Fabric	3.40	3.00	2.70
Canon PW1156/1080	3.20	2.70	2.50
Red Brown Blue Green	4.70	4.20	3.90
Centronics GLP	3.50	3.00	2.80
Red Brown Blue Green	4.95	4.65	4.25
Daisystep 2000 M/S	2.90	2.40	2.20
Fabric	4.10	3.80	3.50
Epson FX/MX/RX 80	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
LX 80	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
Juki 5510	2.80	2.40	2.20
Red Brown Blue Green	4.00	3.30	3.10
6100 MS	2.30	1.90	1.70
6100 SS	1.40	1.10	1.00
Corr Red Brown Blue	2.50	2.10	1.90
2200 Fabric	3.60	3.30	3.10
2200 SS	3.00	2.60	2.40
2200 Corr	3.90	3.50	3.30
Kaga KP 810/910	3.20	2.70	2.50
Red Brown Blue Green	4.70	4.20	3.90
M/Tally MT 80 M/S	3.80	3.00	2.80
NEC PC 8023	3.60	3.00	2.80
Oki 80/82	1.50	1.20	1.10
Red Brown Blue Green	2.40	2.00	1.80
Panasonic KXP 110	3.90	3.40	2.90
Quendata 2000 MS	2.90	2.40	2.20
Fabric	4.10	3.80	3.50
Seikosha GP80	2.70	2.30	2.10
GP100/250	2.70	2.30	2.10
GP500	3.70	3.10	2.90
Red Broiwn Blue Green	4.90	4.60	4.20
Shinwa CP80 M/S	3.80	3.00	2.80
Smith Corona			
D100/200	4.90	4.50	4.00
EL1000/2000 M/S	8.30	7.70	7.00
Fabric	3.70	3.40	3.30
Corr	4.80	4.50	4.30
Star Gemini 10x 15x	1.50	1.20	1.10
Red Brown Blue Green	2.40	2.00	1.80
NL 10	5.50	4.80	4.50
Walters WM80 M/S	3.80	3.00	2.80
2000	3.70	3.30	2.90

If the ribbon you require is not listed ring 0707 52698 and let us quote

Head Cleaners

Discs with 15ml cleaning solution

5¼" Head Cleaner	4.00
3½" Head Cleaner	5.00

Printer Leads

Centronics lead to connect BBC to Epson Kaga Canon etc.

1 MTR	6.30
2 MTR	8.50

Printout Binders

Adjustable hardback ring binder for 11x9½ to 12x9½ cont paper 40mm paper capacity

BLUE RED or BLACK	£4.90 each
set of 5 indexes	£2.30

Disc Mailers

	Price each 50+	100+
Rigid Cardboard holds up to 3 discs	40p	28p

Swivel Bases

for Monitors

Pan tilt revolves around 360°
12.5° tiltable up and down
adjustable by front mechanism.

12" Monitors	**£12.00**
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Adjustable Copy Holders

A4 Adjustable desk clamping. Magnifying cursor line paper height adjustable clip, paper thickness adjustment.

£19.80

A4 Adjustable desk clamping. Plate positioned 360°.

£13.90

Printer Stands

5mm clear perspex
405 x 325 x 100mm

80 column printers	£17.90
132 column printers	£24.90

Micro Media Brand Universal 5¼" Discs

Reversible with 2 notches and index holes. Lifetime guarantee, hub rings, envelopes, labels. Suitable for 40 or 80 track. Packed in plastic library case.

10+	30+	50+
9.40	**8.90**	**8.50**

Unbranded 5¼" Discs

Certified lifetime warranty hub rings, envelopes, labels

Prices per 10 Discs

	10+	30+	50+
SS/DD 40	6.50	6.00	5.50
DS/DD 40	7.50	7.00	6.50
DS/DD 80	8.50	8.00	7.50

Unbranded 3½" Discs

Lifetime Guarantee/label sets

SS/DD	17.00	16.00	15.00
DS/DD	19.00	18.00	17.00

3M 5¼" Lifetime Guarantee

SS/DD 40	10.80	10.40	10.00
DS/DD 40	12.80	12.40	12.00
DS/DD 80	17.70	17.00	16.50

3M 3½" Lifetime Guarantee

SS/DD	20.50	20.00	19.00
DS/DD	27.50	27.00	26.00

Verbatim Datalife 5¼"

SS/DD 40	11.70	11.40	11.10
DS/DD 40	14.70	14,40	14.10
DS/DD 80	19.70	19.40	19.10

Computer Labels

Continuous fanfold, sprocket fed

Price per 1000	1,000	2,000
70 x 36	4.20	3.80
89 x 36	4.30	3.90
89 x 49	5.90	5.30
102 x 36	4.50	4.20

Please state no. of labels across the sheet (1, 2 or 3).

9½" Backing Sheet for Fixed Tractor

	1,000	2,000
70 x 36 3 across	4.20	3.80
89 x 36 2 across	6.60	6.30
102 x 36 2 across	6.70	6.40

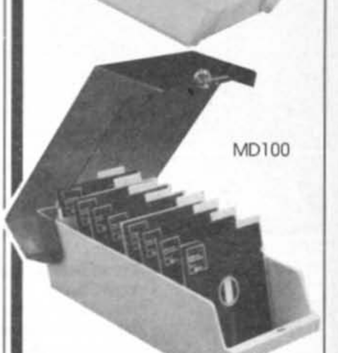
Computer paper

Plain fanfold, micro perf edges

Size	Weight gsm	1000's per box	Price per box 1 box	2 bxs +
11x9½	60	2	12.50	11.80
	80	2	15.50	14.20
EXACT A4				
11⅗x9¼	70	2	20.90	18.50
	90	1	13.20	11.00

A4 Fixed tractor paper available

MM100
Lift off lid



MD100

MM50
Lift off lid

MD50

MM40

Disc Boxes

	1	3+
MM 100 5¼ x 100	11.70	10.00
MD 100 5¼ x 100	11.70	10.00
MM 50 5¼ x 50	8.70	7.90
MD 50 5¼ x 50	8.70	7.90
MM 40 3½ x 40	8.50	7.40
Rexel Mini Disc Box	5.00	
Plastic Library Case	1.50	

All MM boxes anti-static with lock

● Educational and HMG orders accepted. ● Trade enquires. ● Personal callers welcome. ● Open Sat 10am - 4pm

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-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

NEW BBC PRODUCTS FROM CLARES

Enhanced BETA-BASE £25

40 80 3" 0

SPECIFICATION

1) Random Access	- disc based, single or dual drives
2) File Size	- max 65,000 records
3) Record Size	- up to 2048 characters and 200 fields
4) Field Size	- up to 254 characters
5) Holds	- approx 1200 ADDRESS records per 100k
6) Search	- 5 search fields using powerful options
7) Sort	- 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

*CALCULATE - using any valid expression
*PRINTOUT - Powerful options
*REDEFINE - Titles, fields etc.
*TRANSFER - From one file to another
*GLOBAL ENTRY - of repetitive data
*SEARCH LISTS - Allow creation of sub Databases within main Database
*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure

BETA-BASE UTILITIES £12.00

40 80 3" 0

Extend the power of Beta-Base with the extra facilities provided on this disc.

*MAIL MERGE
*LABEL PRINTER
*DISC SORT
*EXTENDED SEARCH
*FREE FORMAT TRANSFER
*FAST PACK
*STATUS

The MAIL MERGE alone is worth £12 so you get a real bargain with this disc. The features are so numerous that we cannot mention them all here.

Ask for our UTILITIES DATA SHEET if you want more information.

40 80 3" 0 ______ DISC
40 ______ 40 TRACK
80 ______ 80 TRACK
3 ______ 3" DISC - ADD £3
______ EPROM

Send for detailed newsletter.
All prices inclusive of VAT & Carriage - NO EXTRAS! Please state 40 or 80 track disc and state D.F.S. you use.

FONTWISE PLUS £20.00

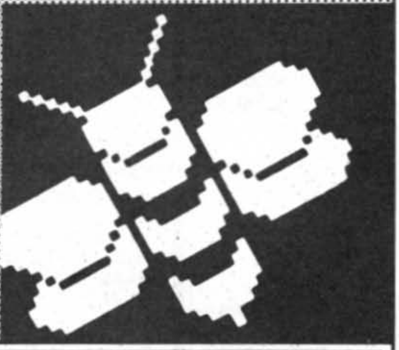
40 80 3" 0

FONTWISE PLUS is now compatible with VIEW, MINI OFFICE II, EDWORD 2 and INTERWORD as well as WORDWISE and WORDWISE+!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
- Tabs
- Temporary indent
- User definable line feed
- User definable character spacing
- Non proportional fonts
- Now with 12 fonts
- Plus many more features

If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.



MACROM £40 £35 DISC

40 80 3" 0

MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

Ask for a data sheet today

RAMROD £40 ROM £35 DISC

40 80 3" 0

RAMROD is the ultimate in toolkit ROMs and is fully compatible with the whole BBC range from Model B through to the MASTER 128 and including both 6502 and TURBO co-processors. RAMROD adds 54 new commands to your computer. Areas covered are DISC (DFS & ADFS), GENERAL (memory commands etc.), ROM (including sideways RAM) and TUBE.

RAMROD provides commands to dump memory or a disassembly of memory to a printer. Editors can display the screen in 40 or 80 column mode.

DISC

Edit discs and search for ASCII or HEX sequences.

GENERAL

Edit, search, disassemble, compare, dump to printer and relocate ANY area of memory including the SHADOW screen. List vectors in use, load and save function keys even on MASTER etc.

In addition to the above you can move between ROM/RAM banks using (CTRL) Cursor Keys when in either memory or disassembly mode PLUS you can switch between memory editor and disassembler by pressing (CTRL)(TAB).

ROM

Includes commands for listing, loading, saving, wiping, swapping, ROM images. PLUS formatting and titling RAM banks for the ROM filing system and saving programs in RFS format.

TUBE

Provides the same memory commands as GENERAL plus SHIFT and COMPARE memory across the TUBE both ways.

We cannot do justice to RAMROD in the space here so please ask us to send you a fuller data sheet - RING NOW!

NEW PRODUCTS

Watch out for a fabulous new product which will be released during SEPTEMBER for the MASTER and its compatibles.

This is a high quality art package called ARTROOM but it offers many features not provided elsewhere. It is a full screen package and is written by the authors of FLEET STREET EDITOR so you know that it will be good.

Ask for a data sheet NOW!

Clares
MICRO SUPPLIES

98 Middlewich Rd.,
Northwich, Cheshire CW9 7DA.
Tel: 0606 48511
Open 9—5pm Monday—Friday
LUNCH 12.30—1.30

BEEBUGSOFT Serious Software

FROM BEEBUG

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COMMAND

The ultimate in communications for the BBC Micro & Master

NEW

COMMAND is a very special communications Rom. Unlike much communications software it is *COMMAND* driven, and has a very powerful extended command set. In addition, for ease of use, all major features are available at the touch of a function key. Because the Rom may be command driven (using *CALL, *ANSWER, *DOWNLOAD etc) it is exceptionally easy to link commands together in Basic to meet your own individual needs.

Viewdata Terminal
A full feature Viewdata Terminal giving access to thousands of pages in Prestel, Micronet, Viewfax etc.

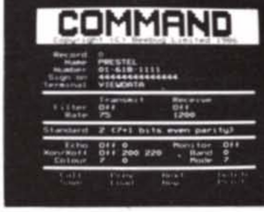
Text Terminal
Send files to a friend for the cost of a phone call, and access Telecom Gold, Microlink and thousands of Bulletin Boards.

Telephone Directory
Set up the name, number and modem configuration of your favourite Bulletin Boards for easy recall at a later date. No need to remember telephone numbers anymore, just type *CALL 'PRESTEL' for example, and everything will be done automatically for you — even passwords are entered.

Viewdata Editor
A complete teletext editor, with a full range of editing commands, on-screen help, and a pixel editor.

The shortest Bulletin Board in communications history?

```
10 REPEAT
20 *ANSWER
30 *SAY "No news is good news!"
40 *DISCONNECT
50 UNTIL FALSE
```



```
COMMAND
Copyright (C) Beebug Limited 1986

  Record  0
    Name  PRESTEL
  Number  01-618-1111
 Sign on  4444444444444444
Terminal  VIEWDATA

          Transmit        Receive
  Filter  Off             Off
    Rate  75              1200

Standard  2 (7+1 bits even parity)

    Echo  Off 0           Monitor  Off
 Xon/Xoff Off 200 220   , Band     0
  Colour  7   0            Mode    7
```

This simple program forms the basis of a Bulletin Board, and can be extended to your own requirements.

Over 45 More Commands
These provide building blocks to create you own customised communications software. For example, your own personal bulletin board or a program to call Prestel at a given time and 'grab' specified frames or send a message.

- ANSWER
- CALL
- SAY
- CONNECT
- GRAB
- DOWNLOAD
- UPLOAD
- DISCONNECT
- LISTEN
- SEND
- ECHON
- SDUMP

Supplied on 16k Rom, with comprehensive manual, fitting instructions and keystrip.

£39.00 *Please specify modem type when ordering.*

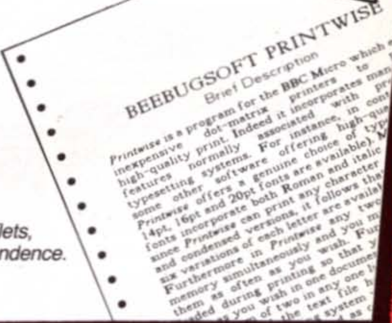
PRINTWISE

Professional looking documents with the minimum of fuss

NEW

PRINTWISE is the ideal companion to Wordwise, View and Interword.
Simply take your text file, specify the font styles you require, and Printwise will do the rest.
It is very easy to use and no programming skills are necessary.

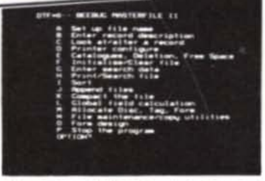
- *Printwise offers 18 authentic fonts with a choice of 4 standard typesizes (12pt, 14pt, 16pt and 18pt).*
  All fonts can be used in the same document — even in the same line if you wish!
- *Printwise has a virtual-memory facility allowing it to handle long text files.*
  In addition all typestyles may be Roman or italic and in normal, bold or condensed.
- *Comprehensive range of formatting commands including: proportional spacing, justification, line spacing, column width and many many, more!*
- *A very powerful font editor is included to design your own fonts.*
  Printwise is a low-cost publishing aid, and allows you to create professional looking magazines, leaflets, posters - the possibilities are endless, also use it to produce 'near-letter quality' printout for correspondence.
  Supplied on disc with a comprehensive manual.
- *Suitable for all Epson compatible printers.* **£30.00**



BEEBUGSOFT PRINTWISE

Brief Description

NEW RELEASE



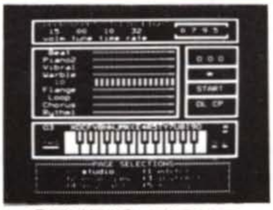
```
DTF=0-- BEEBUG MASTERFILE II

   A  Set up file name
   B  Enter record description
   C  Look at/alter a record
   D  Printer configure
   E  Catalogue, Deletion, Free Space
   F  Initialise/Clear file
   G  Enter search data
   H  Print/Search file
   I  Sort
   J  Append files
   K  Compact the file
   L  Global field calculation
   M  Allocate Disc, Tag, Form
   N  File maintenance/copy utilities
   O  Form design
   P  Stop the program
OPTION?
```

ADFS MASTERFILE

ADFS Disc **£22.00** DFS Disc **£22.00**

MASTERFILE is a general purpose file management package allowing large amounts of information to be stored and processed. It is extremely powerful yet flexible and easy to use. Once set up, the information may be retrieved, sorted on any field, displayed, updated, printed etc. as required. Compatible with Wordwise and View.

ADFS MASTERFILE is a new version that takes full advantage of the higher capacity of ADFS discs. An upgrade is available for DFS Masterfile II — please contact us for details.



STUDIO EIGHT

Disc **£22.00** Tape **£17.00**

The sound studio. Contains over 20k of machine code which converts your micro into a 4 voice synthesiser with an 8 track digital recorder with rhythm and drum machine. Features include:

- Built-in 8 track recorder
- 32 instruments available
- Sliding fader controls & studio mixer
- Instrument & Envelope definers
- Full screen music editor
- Tracks may be overlayed to build tunes

An exciting real-time studio system.

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Prices include VAT.
Please add £1 post & packing.
Telephone Orders & further information:

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Beebug
Mail Order
Dolphin Place
Holywell Hill
St Albans
Herts
AL1 1EX

See Beebug's full mail order price list, elsewhere in this issue.

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The products in this price list are available in our showroom in St. Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open Mon-Sat 9-5.30 and Thursday 9-8.00 pm and there is ample parking at the rear at our premises.

Late Opening on Thursday

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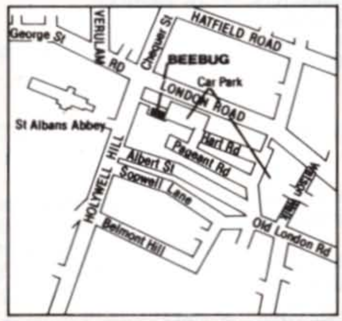
Only if you quote your membership number

If you are not yet a member, join now on the form overleaf and claim your 5% discount on the hardware/software that you need.



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Tel: 0727 40303 — Multi-lines

- **Computers**
- **Printers**
- **Monitors**
- **Disc Drives**
- **Budget Discs**
- **Software**

ALL OUR PRICES INCLUDE VAT

COMPUTERS

Code	Description	Price	Mem Price
0196G	Compact+Col. Monitor	694.00	659.30
0197G	Compact+Mono Monitor	544.00	516.80
0198G	Compact TV System	464.00	440.80
0199G	Compact Entry System	444.00	421.80
0200G	Master 128	474.00	450.30
0202G	Master ET	381.32	362.25
0223G	Master Disc Drive Unit	316.00	300.20
0230C	65C102 6502 "Turbo"	119.00	113.05
0231D	80186 Co-Proc	228.85	217.41
0234B	M128 Econet Module	48.87	46.43
0235B	M128 Eprom Cartridge	15.18	14.42
0240C	M128 Manual 1 ADJ22	14.95	14.20
0241C	M128 Manual 2 ADJ23	14.95	14.20
0242C	M128 Adv Ref Manual	19.00	18.05
0203F	'6502' 2nd Processor	225.00	213.75
0204F	'Z80' 2nd Processor	399.00	379.05
0205F	Acorn Prestel Adapt	138.00	131.10
0206F	Acorn Teletext Adapt	115.00	109.25
0217B	1770 Disc Interface	50.24	47.73
0218B	ADFS Upgrade 1770	29.33	27.86
0209B	1.2 DNFS Rom	19.78	18.79
0207B	Basic II Rom	21.85	20.76
0208B	1.2 Operating System	6.90	6.55
0250B	Compact 5.25" Disc Drive Lead	12.32	11.70
0298B	Compact Printer Lead	9.78	9.29

DISC DRIVES

Code	Description	Price	Mem Price
0600F	Cumana CSX100 40T	106.95	101.60
0610F	Cumana CS100 40T	126.50	120.18
0601G	Cumana CDX200 40T	215.00	204.25
0602F	Cumana CSX400 40/80T	142.60	135.47
0603F	Cumana CS400 40/80T	162.15	154.04
0604G	Cumana CD800S 40/80T	286.35	272.03
0614F	Cumana CS100E	118.45	112.53
0615F	Cumana CS400E	155.00	147.25
0611B	Cumana Disk Guide	1.90	1.80
0650B	Memorex DiscsSSDD 40	15.50	14.73
0651B	Memorex DiscsDSDD 80	25.50	24.22
0669B	Memorex 10 x 35" Discs	25.00	23.75
0653B	Disc Case 10 discs	2.25	2.14
0654C	Disc Box - up to 50	10.00	9.50

MONITORS

Code	Description	Price	Mem Price
0501G	Kaga KX1202 Green	116.00	110.20
0502G	Kaga KX1203 Amber	116.00	110.20
0556B	Taxan 1202/2/3 BNC	3.90	3.70
0503G	Zenith 123 12" Green	83.00	78.85
0504G	Zenith 122 12" Amber	88.37	83.95
0530G	Microvitec 1431 Mon.	239.00	227.05
0531G	Microvitec 1451 Mon.	289.00	274.55
0550B	1.0m Mon. Lead RGB	5.75	5.46
0535G	Supervision III RGB	379.50	360.52
0536G	Supervision II RGB	318.55	302.62
0555B	Supervision Mon. Lead	7.00	6.65
0570D	Stand for Supervision	29.00	27.55
0551E	Single Master Plinth	16.10	15.30
0552E	Single Plinth	12.65	12.02
0553F	Double Plinth	23.00	21.85

PRINTERS

Code	Description	Price	Mem Price
0299G	Panasonic KX-P1080	170.20	161.69
0311G	Kaga KP 815	299.00	284.05
0316G	Taxan KP 915 17"	410.37	389.85
0319G	Epson FX85 NLQ	368.00	349.60
0320D	FX85 Tractor Feed	32.20	30.59
0321D	FX85 Sheet Feeder	130.00	123.50
0300G	Brother HR15XL Para	350.75	333.21
0310G	Juki 6100 Daisywheel	362.25	344.14
0309F	Ibico LTR1 NLQ	105.16	99.90
0303G	Canon PJ1080A Col.	520.00	494.00
0308G	Epson JX 80 Colour	520.00	494.00
0318G	Epson HI 80 Plotter	368.00	349.60
0401B	2M Printer Lead	8.00	7.60
0402B	Epson FX/RX80 Ribbon	4.00	3.80
0403B	Epson FX/RX100 Ribbon	5.00	4.75
0408B	Canon/Texan Ribbon	5.63	5.35

0409B	Black Cart PJ1080A	7.19	6.83
0410B	Colour Cart PJ1080A	9.99	9.49
0413B	LX 80 Ribbon	4.60	4.37
0414B	Ibico Ink Roller	4.60	4.37
0415B	Epson JX80 Ribbon	16.22	15.40
0417B	Shinwa CP80 Ribbon	3.54	3.36
0418B	Juki 6100 S/S Ribbon	1.55	1.47
0423B	Panasonic KX-P1080 Ribbon	5.75	5.46
0406D	11" *9.5" Paper 2000	14.03	13.33
0407C	3.5" *17/16" Labels	5.63	5.35
0416B	Dust Cover KP810	5.45	5.18

WATFORD HARDWARE

Code	Description	Price	Mem Price
0213B	Watford DFS Rom+Man	27.48	26.11
0214B	Watford DDFS Kit	56.35	53.53
0216B	Watford DFS Manual	6.95	6.60
0219B	Watford 1.43 DFS Kit	62.10	59.00
0702B	Watford 32K RAM Card	67.28	63.91
0709D	Watford Eprom Eraser	33.35	31.68
0717B	Watford Sideways ZIF	17.83	16.93
0736B	Watford 12 Rom Board	36.80	34.96
0737B	Watford Battery	4.37	4.15
0751B	Watford 16K Module	32.20	30.59
0752B	Watford Diagnostic	23.00	21.85
0753B	Rom/Ram Board 64K	67.85	64.46
0754B	Rom/Ram Board 128K	102.35	97.23
1120B	Watford TD Rom (SD)	28.75	27.31
1121B	Watford TD Rom (DD)	28.75	27.31

COMPUTER CONCEPTS

Code	Description	Price	Mem Price
1100C	Wordwise Plus	46.00	43.70
1101B	WW + Progbook & Disc	20.53	19.50
1102B	Wordwise	28.75	27.31
1103B	C.C. Graphics ROM	24.73	23.49
1104B	Printmaster (Epson)	28.00	26.60
1105B	Printmaster (Star)	28.00	26.60
1107B	Speech ROM	28.00	26.60

1110B	Intersheet	44.85	42.61
1111B	Hi Intersheet Disc	5.75	5.46
1112B	Hi Wordwise + Disc	5.75	5.46
1113B	Caretaker Rom	28.75	27.31
1114B	Interchart	29.90	28.41
1115B	Speech System TTS	30.99	29.44
1117B	Interword	50.03	47.52

OTHER HARDWARE

Code	Description	Price	Mem Price
0701B	Aries B32 RAM Card	93.15	88.49
0704B	ATPL ROM Board BBC	39.67	37.69
0735B	ATPL Battery Backup	17.37	16.50
0740B	Aries B12 Rom Board	46.00	43.70
0749B	Aries B12C Adaptor	5.87	5.57
0705B	2764 8K Eprom	2.64	2.51
0706B	27128 16K Eprom	3.33	3.17
0707B	6264 8K Ram	3.68	3.50
0708B	Eprom Extractor Tool	3.45	3.28
0710B	Spotlife Rom Blower	75.90	72.11
0714B	BBkey Labels	2.09	1.99
0715B	Dust Cover BBC B/B+	3.45	3.28
0734B	Dust Cover Master	4.60	4.37
0718B	Voltmace 3B Single	9.99	9.49
0719B	Voltmace 3B Twin	17.00	16.15
0720B	Voltmace Delta 14B	12.50	11.88
0721B	Voltmace Delta 14B/1	13.00	12.35
0762E	Beebug Magic Modem	90.00	85.50
0763E	Beebug Modem + S'ware	104.00	98.80
0810D	BBC Keyboard	52.90	50.26
0811B	Video ULA Chip	17.25	16.39
0812B	A to D D7002C Chip	5.29	5.03
0814B	Keyboard Connector	5.75	5.46
0815B	65C02 CPU	13.80	13.11
0764F	Red Box Starter System	129.00	122.55
0765D	Red Leader	59.95	56.95
0766D	Red One	34.95	33.20
0767D	Red Two	34.95	33.20
0809D	Master Keyboard	52.90	50.26
0823D	Master PSU	69.50	66.03

ACORNSOFT

Code	Description	Price	Mem Price
1022C	View 3.0 Rom	66.70	63.36
1002B	Acornsoft Hi-View	44.28	42.06
1014B	View Print/Drive Disc	9.77	9.29
1043B	Acorn Viewspell Rom	34.02	32.32
1021B	Acorn Viewindex Disc	14.37	13.66
1019B	Acorns Viewstore Rom	44.28	42.06
1030B	Acornsoft ViewPlot	25.30	24.03
1001B	Acornsoft View Sheet	44.28	42.06
0243B	Master Lisp C.ROM	59.69	56.70
1003B	Acornsoft Lisp Rom	41.40	39.33
1025B	Acornsoft Lisp Cass	10.35	9.83
1041B	Acornsoft Forth Rom	38.53	36.60
1027C	Micro PROLOG	74.75	71.01
1033B	Microtext Disc	55.20	52.44
1034C	Microtext Plus Rom	240.00	228.00
1035B	6502 Dev. Pack	45.00	42.75
1004B	Acornsoft BCPL	50.03	47.52
1005B	Acornsoft Comal	41.97	39.88
1006B	Acornsoft Logo	50.71	48.18
1007C	Acornsoft ISO Pascal	50.71	48.18
1028B	Pascal Generator	32.78	31.14
1008B	Acornsoft Basic Ed	28.00	26.60
1040C	Micros Business Disc	47.27	44.90
1038B	Database Disc	14.50	13.78
1017B	Acornsoft GXR B	25.43	24.16
1039B	Creative Sound Disc	19.00	18.05
1015B	Acornsoft Revs Disc	17.08	16.22
1029B	Revs 4 Tracks Disc	11.95	11.35
1032B	Revs 4 Tracks Tape	9.32	8.85
1016B	Acorn Aviator Disc	17.08	16.22
1036B	Elite Disc All'vers	14.95	14.20

AMX MOUSE

Code	Description	Price	Mem Price
0703B	AMX Mouse	72.63	69.00
1150B	AMX Desk Disc	19.00	18.05

A Master 128 for as little as £225.30
OR a Compact Colour System for £434.30

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S/2908/3/G/500406

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The COMMAND ROM

COMMAND is a very special communications Rom. Unlike much communications software it is 'command' driven, and has a very powerful extended command set. In addition, for ease of use, all major features are available at the touch of a function key. Because the ROM may be command driven (using ★CALL, ★ANSWER ★DOWNLOAD etc.) it is exceptionally easy to link commands together in BASIC to meet your own individual needs. Other features include: A full feature Viewdata Terminal and Text Terminal, Telephone Directory, Viewdata Editor, and over 45 more commands. Please telephone or write for further details.

Modem + software order code 0763E

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1152B	AMX Database Disc	19.00	18.05
1154C	AMX Pagemaker Plus	40.00	38.00
1155B	AMX Superart Rom	40.00	38.00
1156B	AMX Paint Pot Disc	10.99	10.44
1160B	AMX Utilities	10.99	10.44
1161B	AMX Max	19.00	18.05
1162B	AMX Pagemaker Plus Master	40.00	38.00
0757B	AMX Mouse (MASTER)	72.63	69.00

OTHER SOFTWARE

Code	Description	Price	Mem Price
1123B	SPEECH! Disc 40/80T	11.95	11.35
1124B	Citadel 40/80	11.95	11.35
1127B	White Knight 1770	18.63	17.70
1128B	Movie Maker	20.95	19.91
1129B	THRUST	11.95	11.35
1130B	REPTON2	11.95	11.35
1170D	Fleet Street 40T	37.95	36.05
1171D	Fleet Street 80T	37.95	36.05
1135B	Instant Mini Office	59.95	56.95
1173B	Mini Office II 40T	16.50	15.68
1174B	Mini Office II 80T	16.50	15.68
1175B	Clares Replica III	15.00	14.25
1011B	BBCsoft UltraCalc 2	70.00	66.50

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1418A	£1 Gift Voucher	1.00	1.00
1419A	£5 Gift Voucher	5.00	5.00
1420A	£10 Gif Voucher	10.00	10.00

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0657B	10 x 40 T SS DD Discs	9.90	9.41
0658B	10 x 40 T DS DD Discs	10.42	9.90
0659B	10 x 80T SS DD Discs	10.42	9.90
0660B	10 x 80T DS DD Discs	10.90	10.36
0661E	25 x 40T SS DD Discs	23.00	21.85
0662E	25 x 40T DS DD Discs	26.47	25.15
0663E	25 x 80T SS DD Discs	26.47	25.15
0664E	25 x 80T DS DD Discs	29.00	27.55
0665E	50 x 40T SS DD Discs	48.00	45.60
0666E	50 x 40T DS DD Discs	50.00	47.50
0667E	50 x 80T SS DD Discs	50.00	47.50
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ADDRESS: ____________ **POSTAGE** £ ______

____________ **TOTAL** £ ______

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POSTCODE: ____________ **MEMBERSHIP NO:** ____________

Access/Visa No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ **Expiry Date** ☐☐

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Castle challenge

Program: Ravenskull
Price: £9.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

THE evil Baron Strieg has stolen the silver crucifix. Without its protection the village of Austburg is powerless against the local zombie population.

To save the village you must enter Ravenskull castle and locate the four parts of the cross.

Before starting this arcade adventure you select your role – elf, wizard, warrior or just run-of-the-mill adventurer.

Both your appearance and the treasure you must find is determined by your selection.

The screen provides an aerial view of yourself and your immediate surroundings. As you walk in one of the four possible directions the screen scrolls smoothly, revealing more of the castle.

You can toggle between this and the objects screen, where you select which of the items in your rucksack you wish to use in a particular situation.

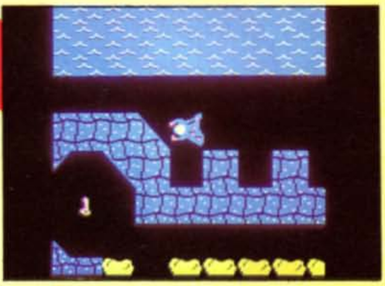
The playing area is 64 times the size of the screen. The castle is built on four levels, with one quarter of the crucifix hidden on each.

But you can pick up a piece of crucifix only when you have collected every item of treasure on that level.

The castle is constructed as a giant maze, with sections closed off by different types of door.

Some of these can be opened using keys, but while these all look the same each one will only open a specific door.

Apart from keys you will find magic scrolls and potions which will give you special powers – or poison you!



Some the castle's nastier residents are the ravenbees and you will need split second timing to avoid these little beasties.

Ravenskull is a very enjoyable game. The puzzles are devious and the correct route is not always obvious but you know instinctively when you're on the right trail.

Steve Brook

Sound	*4*
Graphics	*8*
Playability	*9*
Value for money	*9*
Overall	*8*

Poker plus pulchritude

Program: Samantha Fox Strip Poker
Price: £12.95 (disc)
Supplier: Martech, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE.
Tel: 0323 768456

BE the envy of your friends! Coax the delectable Samantha Fox out of her garments in the comfort and privacy of your own living room! That is assuming you can beat her in a game of strip poker.

Miss Page Three herself, has challenged you to a game of five card draw poker. Just to make things a little more interesting she has agreed to shed items of her clothing when she starts to lose.

If you're feeling sporting you could do likewise but wear a hat and coat to give yourself a sporting chance – Sam does!

You each begin the game with £1,000. Your five cards are dealt face up and Sam's face down, for obvious reasons.

At this stage the first round of betting takes place. Three possible courses of action are shown on the screen: You can throw in your hand, call, or raise the bidding.

If you wish to raise the bet you will be prompted to enter a value. The maximum bet is £100 and the minimum is £1 more than the previous bet.

Once you have both "called" you are given the opportunity to throw away any or all of your cards, which are replaced with new ones from the deck.

Then the second round of betting commences, and when you have both called again the computer displays both hands and announces the winner.

If you won then Sam hands over the money and boots up the disc drive. Within seconds the best reason you ever had for buying that high resolution monitor is filling the screen in glorious digitised black and white.

The quality of the image is very good. The same shot is displayed on several occasions until you've won sufficient of Sam's funds for her to shed a little more.

Sam's not a particularly good player, losing everything (cash!) in under an hour the first time we played.

The novelty may wear thin after a few games, but she should still prove to be a talking point at your parties.

Martech has done an excellent job in spicing up a standard poker game. So how about a Tom Cruise version for the ladies?

Nev Astly

Sound	*3*
Graphics	*10*
Playability	*8*
Value for money	*8*
Overall	*8*

Speedy new Elite

Program: Elite
Price: £14.95 (5¼in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

FOR those who don't already know, Elite is a shoot-'em-up and space trading game where you buy and sell cargo to increase your financial viability.

With your increased store of money you purchase fuel, missiles and other add-ons to give you more cargo space and better kill power.

The complexity of the program allows you to choose your life-style – trader, pirate-killing bounty hunter, pirate preying on innocent traders or even a meteor-miner travelling between planets cutting up asteroids.

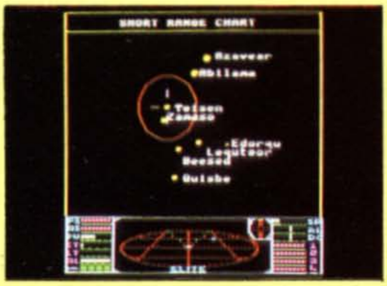
But wherever you go and whatever life-style you choose, you cannot avoid the marauding hordes of pirates who will descend on your single Cobra Mk III.

A sample journey runs like this: Using the short range chart, examine the nearby star systems for a suitable planet and compare its technology level with the trade goods available at your present planet.

Choose the planet that will bring you the most profit and with your universal credits buy a cargo hold full of goods.

Launch from the space station and make a hyperspace jump to your target system. Line up on the planet and apply full thrusters towards it.

The chances are high, depending on planetary political systems, that you will either get jumped by pirates or face a head-on collision with another trader coming your way or – in this new version – a smash with an asteroid or boulder.



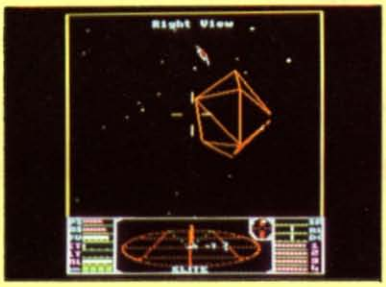
Short range scan

With skill and luck you reach the safe area around the space station, dock and sell off your goods for a handsome profit.

With that brief view of what Elite is about I'll move on to a comparison between the old and new versions.

In the new packaging you get a manual, a function key strip and a flippable disc containing the old version on 40 tracks on one side and the new 80 track version on the other.

The new disc version, for B+ and later models, is slower to load, taking a good fifteen seconds. But once there the reason becomes apparent – you now have a stand-alone program.



Zapping an asteroid – or two

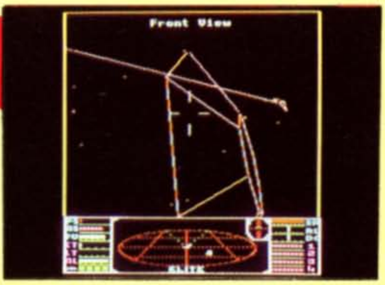
No more disc accesses during the game, each launch and docking procedure takes less than a second and each hyperspace jump is virtually instantaneous.

The next obvious improvement is in colour. Using shadow ram, the split-mode screen is Mode 2 at the bottom for status using eight colours and Mode 1 on the top for the display using four colours.

While the status display is basically the same with little touches here and there, the scanner comes alive with colour.

For those bred on the original, running Elite on the Master Turbo or with a 6502 second processor is going to be a terminal experience. You'll find it hard to stay alive.

There is virtually no slowdown during combat – even when a planet is on the screen. And while your reactions stay the same, the pirates are now much faster than before.



Thargoid attack

If you have been using the disc version, get set for the new addition – asteroids. Buy that mining laser first chance you get, mount it on the left or right side of your craft and go chase some minerals.

The best technique is to chase the asteroid, move alongside and match speeds, switch to side screen and give it two blasts from the mining laser, then pick up the pieces.

But watch out for the asteroid hermits – they don't take kindly to having their homes blown to bits and usually have well-armed ships.

Somewhere out there are ships 40 kilometers long and if you are lucky you may get to see one.

The frequency of pirates appearing around the civilized planets has definitely been increased and the pirates have moved up to the Fer de Lance as one of their favourite ships, but the Kraits and Mambas are all still there.

The Thargoids are worse and even if you have done the second mission don't be surprised when they pull you out of hyperspace in the middle of nowhere.

And finally there's good news for those who don't want to start from scratch – you can load your old Commander file into the new version.

If you have a B+ or better, Elite is certainly worth a look. If you have a second processor or Turbo as well then it is a must.

Commander Lazarus

Sound	*7*
Graphics	*10*
Playability	*10*
Value for money	*10*
Overall	*10*

Outwit the Sentinel

Program: The Sentinel
Price: £9.95 (cassette) £12.95 (disc)
Supplier: Firebird, 64-76 New Oxford Street, London WC1A 1PS.
Tel: 01-379 6755

SENTINEL is a game which possesses something which is far too rare in the software business... originality. It is also well implemented and terribly addictive.

There are some 10,000 levels in the game, each laid out as a landscape of peaks, plateaus and valleys. At the top of the highest peak stands the tall figure of the Sentinel.

The features are constructed from simple rectangles, squares and triangles but they create an amazing feeling of reality.

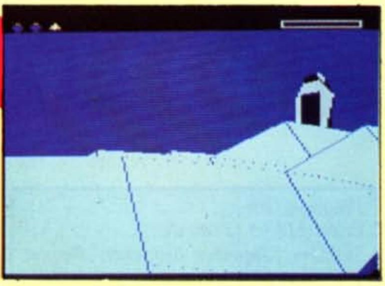
Somewhere high above you stands the Sentinel. Your first job should be to find out where he is and which way he is facing. This is most important as the Sentinel slowly rotates looking for you! Should his gaze fall on you then he will absorb your energy reserves one unit at a time.

The trick is to avoid detection by transporting yourself to a new location before the Sentinel finds you. This is performed by switching on your sights and aiming them at the square to which you wish to transfer.

Pressing R will create a new image of yourself on that square. You can then transfer yourself to this new body, a process which expends 3 units of energy. To reclaim these you turn and face your former body, aim your sights and absorb it.

Your objective is to manoeuvre yourself into a position on the landscape which will allow you to look down upon the Sentinel and absorb him, at which point you are hyperspaced to a more complex landscape.

You can increase your height by creating piles of boulders, costing two energy units each, and positioning your new body on top of the stack.



On the more difficult levels the Sentinel is accompanied by sentries. Occupying the lower peaks they rotate at a faster rate and really reduce your thinking time.

Sentinel will stimulate the old grey matter for many a cold dark winter's night.

Jon Revis

Sound	*9*
Graphics	*9*
Playability	*10*
Value for money	*9*
Overall	*9*

Save civilization

Program: Impossible Mission
Price: £9.95 (cassette) £14.95 (disc)
Supplier: US Gold, Units 2&3 Holford Way, Holford, Birmingham B6 7AX.
Tel: 021-356 3388

PROFESSOR Elvin Atombender, well known computer genius and psychopath, has hacked into the military computers of the major nations.

Within six hours he will have deciphered the launch codes and started world war three. This is how long you are allocated to penetrate his underground stronghold and find the control centre.

The professor's hideaway is a 32 room complex criss-crossed by a network of lifts and it is in one such lift that your mission begins.

Exits to the left and right can be explored or you can press the down key and the lift will descend to the next level.

Your footsteps echo as you leave the lift and run along the corridors – running off the screen causes the adjoining room to be displayed. This is made up of a series of catwalks, some of which can be accessed using mini lifts.

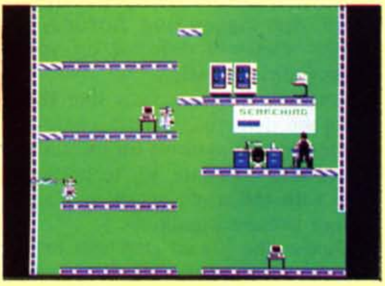
All the rooms are patrolled by the professor's robots which are sensitive to movement and armed with high voltage electrodes.

Using the lifts in the correct sequence will help you to avoid most confrontations with the metal menaces. When an encounter is unavoidable you must rely upon your athletic prowess and split second timing to somersault over the approaching robot.

To enter the professor's control room you need a nine digit code, doled out a digit at a time as you complete a series of sub-puzzles.

Puzzle sections are hidden in the furniture to be found in each of the rooms, as are passwords which can be entered into any of the professor's security terminals.

You search the furniture by standing in front of it and pressing the down key. A searching indicator is displayed, and you keep your finger on the key until the bar reaches zero.



At this point you will be told what you've found, but quite often you won't find anything.

All rooms contain at least one security terminal. Accessing this will enable you to immobilise the robots for a while or reset the lifts to their original position.

Impossible Mission is a very good conversion from the Commodore original.

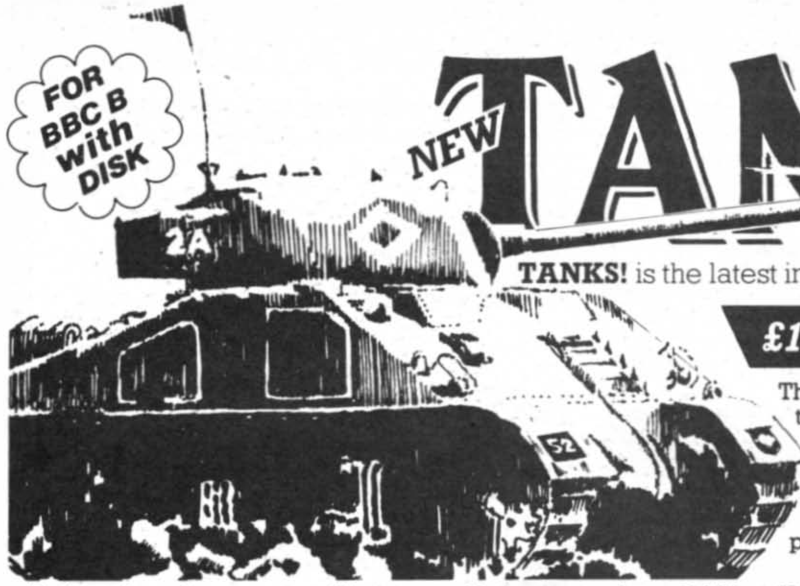
Steve Brook

Sound	*7*
Graphics	*8*
Playability	*8*
Value for money	*8*
Overall	*8*

FOR BBC B with DISK

NEW

TANKS!



TANKS! is the latest in our unique series of battlegames.

£12.95 + £1.00 p&p

The game simulates a Second World War tank battle. You choose from three scenarios: Western Europe 1944. North Africa 1942 or Russia Winter 1943. Then you may choose you forces. **TANKS!** is one player, and you play against the computer.

Action takes place on a scrolling map, with the enemy forces hidden. You must consider the quickest route to your objective, avoid or defuse the mines placed by the opposing forces, hide from marauding enemy bombers, negotiate enemy fortified positions, or destroy them with artillery or mortars. You must keep your tanks refuelled, but protect your valuable petrol trucks. Oh, and of course, you will also have to fight the enemy tanks.

TANKS!, like **SINK THE BISMARCK** is split into sections on disc, which allows a much larger program than would otherwise be possible. For instance, TANKS! is 14K of pure machine code and 18K of data, but runs in hi-res colour MODEs.

SINK THE BISMARCK

'Sink The Bismarck' is the first of a new generation of wargames for the BBC Micro with disc drive. The game is split into several sections, each of which is loaded from disc when required.

'Sink The Bismarck' simulates the conditions in the North Atlantic in May 1941, as the British Home Fleet was despatched to catch and destroy Bismarck. But with a dozen troop and supply convoys in the Atlantic, time was of the essence. You must also consider the strengths and weaknesses of each of your ships, weather, U-boat attacks and fuel limitations.

"Sink The Bismarck has the perfect balance between pure strategy and an arcade game."
Micro User January 1987

"If you've never tried a warfare simulation before them may I suggest that this would be a good place to start? Well designed, playable and good value for a disc-based game."
A&B December 1986

£10.99 plus £1.00 p&p

SINK THE BISMARCK for the BBC Micro with disc. Compatible with all BBC variants and filing systems.

Available from: Design People Software, 77 Grimwade Street, Ipswich, Suffolk IP4 1LN, or from good distributors.

ADD-ONS FOR MASTER 128K

ONE MEGABYTE OF RAM ON A CARD

More and more software relies on the MASTER 64K Sideways RAM to run, forcing many of us to leave the two links L18 and L19 in RAM position and use only one ROM socket for our ROM software. Standard software cartridges are convenient but they have only 2 ROM sockets and frequent swapping may be necessary. Lastly, 64K is not enough to make an effective RAM DISC.

Solidisk memory cards can solve all those problems and enhance your MASTER still further. The RAM CARD can add up to 1 Megabyte of RAM, the ROM CARD has 4 high capacity ROM sockets and a switch to control the two links L18 and L19.

SOLIDISK MEGA-RAM CARD FOR THE MASTER:

Eight 1-Megabit RAM chips hold this Megabyte of memory and the entire system is completely contained on a single card measuring only 85mm × 95mm — half the size of a postcard — yet it has 8 times more RAM than the MASTER.

The control software is in a 16K ROM, also built-in on the card, which will turn this memory instantly into one or two RAM DISCS, or a printer buffer or simply 64 banks of Sideways RAMs which in turn may contain ROM images.

If you feel that One Megabyte may be too much, we have the same card fitted with 256K memory instead. This is still enough to give you in silicon the equivalent of an 80 track disc drive in DFS format (200K bytes) or 16 Sideways RAM banks. At only £100 inclusive of VAT, you pay less than 40p for each kilobyte. And when 1-Megabit RAM comes down in price, you may get it upgraded to One Megabyte later. We foresee Megabyte RAM cards priced as low as £200 towards MARCH 87 — that's less than 20p a kilobyte. So you see, cheap Megabyte MASTERS are just around the corner. The RAM CARD can be a printer buffer, freeing your computer and saving you time. It can be one or two RAM drives replacing physical floppy disc drives. RAM DISC is 10 times faster than physical drives and quiet as they do not have any moving parts. The RAM DISC can be 100K or 200K in DFS format and up to 640K in ADFS, with the one Megabyte card. The maximum RAM disc capacity is 17K less than either 256K or 1024K capacity of the card.

The card may hold ROM images. Up to 16 or 64 images can be held on the card and ⋆LCAT will list them all. Any one of them can run at any time after ⋆SELECT <ROM name>. If Solidisk MDFS 3.0 and/or MADFS 3.0 ROM is installed, you may have both RAM DISC and Sideways ROM images at the same time.

The RAM CARD is simply plugged into any of the two cartridge slots with the label facing you.

Price:

256K RAM CARD (Code R256) and manual	**£100**
Megabyte RAM CARD (Code R1024) and manual	**POA**

SOLIDISK ROM CARD AND T-SWITCH:

This simple card features 4 high capacity ROM sockets, accepting both 16K and 32K EPROMs. One socket can be made to accept a 32K byte static RAM chip (type 62256-15). To select a ROM (or RAM if installed), set a combination for the 2 mini DIP switches. A two position switch is also included to control external links L18 and L19 so that you do not have to open the case just to change the link position. The switch is fitted with proper connectors for easy and secure installation.

Price:

Basic ROM card with T-switch (code R104)	**£15.00**
Same with 32K static RAM fitted (Code R103)	**£27.00**

EPROM PROGRAMMERS AND ERASERS:

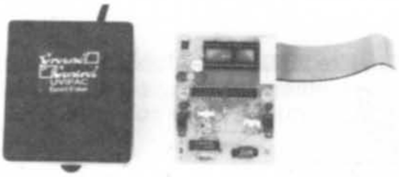
The UVIPROM can program 8K (2764) or 16K (27128) EPROMS from disc files. A software disc (40 track) is supplied and includes a powerful Machine Code Monitor and Disassembler (SOLIMON). A special version — UVIPROM 32-should be ordered to program exclusively 32K (27256) EPROMS.

The MULTIPROM is the DE-LUXE version of the basic design, capable of programming all types including 64K (26512/27513) EPROMS, cased and fitted with Textool Zero-Insertion-Force (ZIF) socket. The UVIPAC is an Eprom ERASER which can erase 3 EPROMS of any type in around 15-20 minutes.

Prices:

UVIPROM (Code U16) Eprom programmer for 8K and 16K	**£20.00**
UVIPROM-32 (Code U32) Eprom programmer for 32K	**£21.00**
MULTIPROM (Code UM) Eprom programmer for all types	**£44.50**
UVIPAC Eprom eraser for all Eproms	**£20.00**

Blank Eproms:
8K: £1 each, 16K: £3 each, 32K: £6 each, 64K: £12 each.

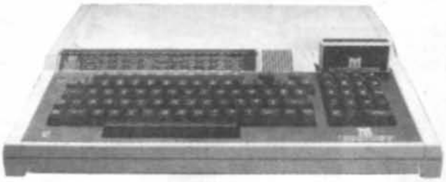


£3 PER DISC OR £10 BY 5 — SOFTWARE FOR SIDEWAYS RAM:

We have 10 discs full of software for the old Beeb which is now 'Masterised'. You can order any volume (M1 to M10) individually for £4 or by pack of 5 discs (MP1 or MP2) at £10.00 each.

Master Software Pack 1:
Volume M1: Menu, Printer, Index, Solimon, Uviprom.
Volume M2: Silexicon and Silexigen.
Volume M3: MACRO BASIC, Linker and Editor.
Volume M4: SFX (special effects) and Soliwin (a window manager).
Volume M5: ADFS 80 track-D/S, Solidisk Datafile Version 3.

Master Software Pack 2:
Volumes M6 to M10 contain around 50 computer games.



BEEB 256K PRICES:

TWOMEG 256K, 16K Manager ROM	**£115.00**
TWOMEG 256K, with Wordwise Plus	**£145.00**
TWOMEG 256K, with InterWord	**£165.00**
FOURMEG 256K, with Wordwise Plus	**£165.00**
FOURMEG 256K, with Interword	**£185.00**
ROM board TRADE-IN discount	**£30.00**

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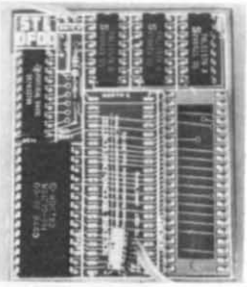
SOLIDISK BUDGET DISC SYSTEMS

Double density disc interface

Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM .... £35.00 (order as XR/DDFS)

1770+8271, dual floppy disc controller interface

Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM .... £40.00 (order as XR/DFDC)



Low cost 3 ½ inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.

Order as 3.5 INCH-DRIVE (80 track/Double-sided) £90.00

FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.

Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.

Normally £30.00 but if order with DDFS or DFDC only £20.00

Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.

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SOLIDISK NEW DEVELOPMENTS

Shadow, Sideways ROM and Sideways RAM All-In-One for £50:

This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).

The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.

The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.

The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).

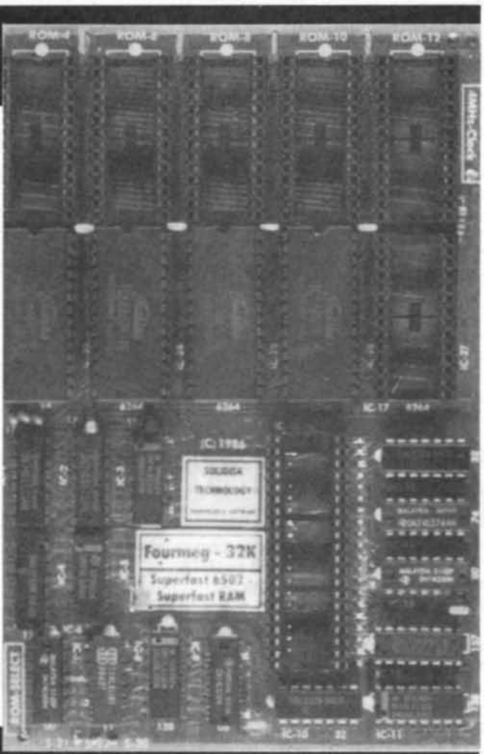
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.

When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).

The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.

The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

TWOMEG-32K	£50.00
65C02 (2MHz) for the above	£10.00
Or upgrade to FOURMEG	£25.00
FOURMEG-32K	£70.00



Real Time Clock & Desk:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.

The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.

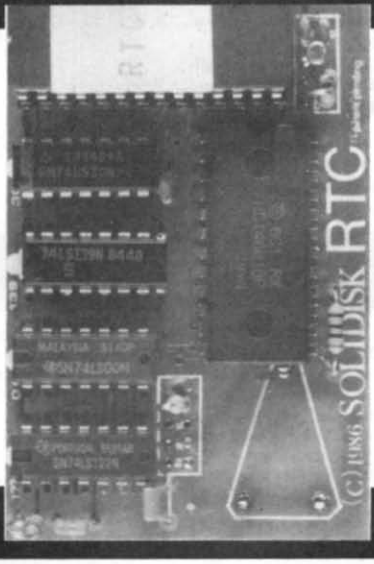
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.

Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.

You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).

The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK	£29.00



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Mastering Amstrad 8256 8512	8.95
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Turbo Pascal for BASIC Prog's	13.95
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dBASE III Plus Handbook (2nd)	18.45
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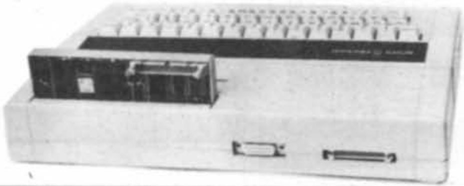
SOLIDISK AUTUMN SALE

Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only: .... £50.00.

Use a disc system with built-in power supply unit.



Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.

The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.

This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.

Order as SWR32 .... £20.00
Order as SWR128 (SWR32 with 96K extension) . £50.00

NB: Manual supplied but software (not strictly required) not included.

The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.

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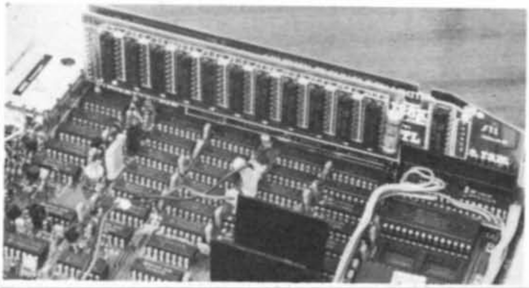

Secondhand Refurbished Beebs:

As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure.

In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745.00, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

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As illustrated with Acorn Mono monitor	**£598.00**
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MP165 printer if bought together	**£220.00**

System Three: MASTER 512K with 80186

A MASTER 128K internally upgraded with the 512K-80186 co-processor, twin 1.3 Megabyte disc drives, 20 MB Solidisk Hard Disc and special ADFS/Double Density DFS ROM, GEM and MASTER software packages.

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With MP 165 printer, 165 cps, NLQ, EPSON compatible (even the ribbon)	**£880.00**

System Four: 520 STM

ATARI slogan is 'Power without the Price'. This is specially true with this 520-STM computer, 16 bit 8MHz-68000 CPU and 512K of RAM, hard disc connector, RS232, Midi interface, printer port and Mouse. The bundled software includes GEM (as on the MASTER 512), word-processor, Basic, Logo and CPM emulator. More information is available on request. Two 80 track, double sided 3.5 inch drives (1.5 Megabytes) complete this system.

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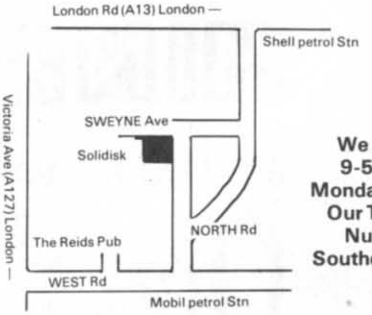

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By TIM THORNHAM

DO you remember the carnival shooting galleries? There, armed with a rifle you shot the moving tin animals. Well, Rhondo is a colourful implementation of this fairground favourite, with lots of added extras.

Your task is to shoot down all the animals, numbers and letters that move across the screen in three rows. Instead of the usual three bullets, you are given 70 and you must shoot all the various characters on the screen.

The game is over when you run out of bullets and you can then enter your name in the high score table if you've done well enough.

On reaching this stage, you will also be rewarded with the chance to gain bonus points by shooting the bullseye on the back of the moving polar bear.

In the main game, shooting the ducks, rabbits and owls gives you 20 points for each knocked down, while the numbers 5 and 10 that appear from time to time are worth their numerical value in bullets.

Look carefully and you will notice five letters that spell BONUS. If you hit them in the order the word is spelt you will be awarded 500 extra points.

The bonus boxes in the top corners of the screen will give you the bonus or penalty as shown if a bullet hits them.

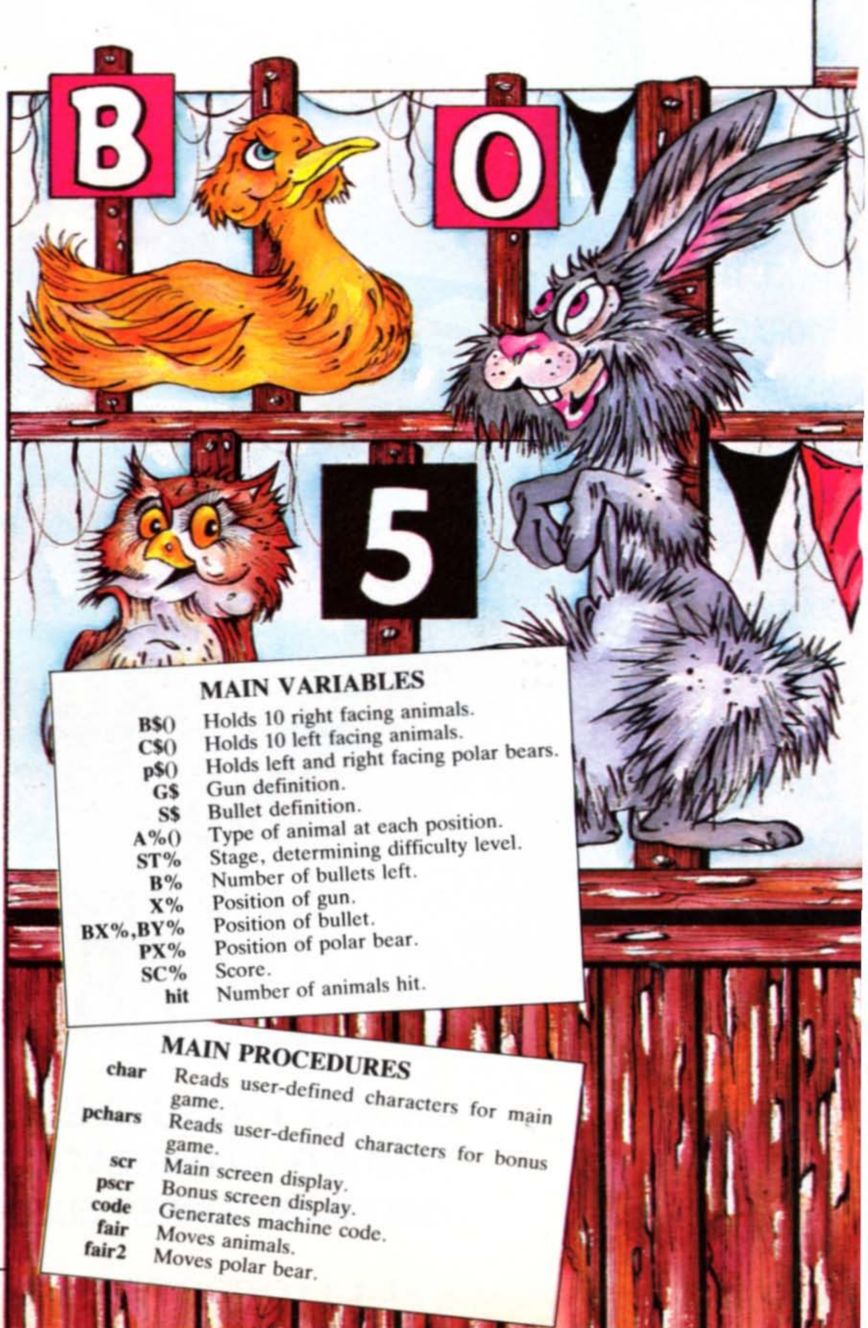
And don't hesitate to shoot the ducks – when they reach the bottom right hand position of the three rows they will remove 10 of your bullets.

To control the gun use Z and X for left and right, and Return to fire.

Once you have typed the listing into your micro, save it before running, as if you make a mistake when you enter the short machine code routine that scrolls the animals it could prove disastrous.

The data at the end provides a compact version of the character definitions and if you get it wrong you will get some odd looking animals.

Disc users will find that the program automatically relocates at &E00.

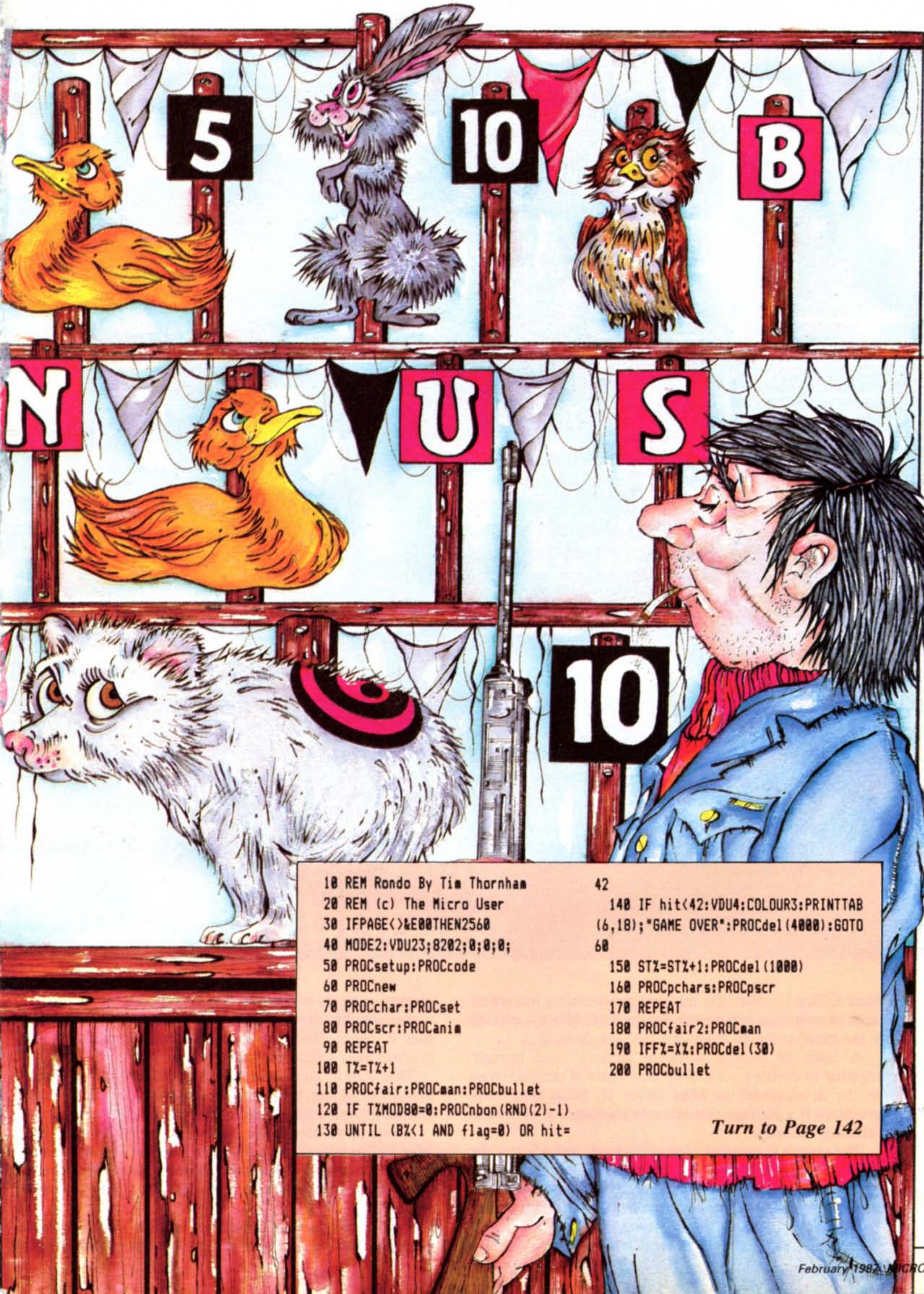


MAIN VARIABLES

B$()	Holds 10 right facing animals.
C$()	Holds 10 left facing animals.
p$()	Holds left and right facing polar bears.
G$	Gun definition.
S$	Bullet definition.
A%()	Type of animal at each position.
ST%	Stage, determining difficulty level.
B%	Number of bullets left.
X%	Position of gun.
BX%,BY%	Position of bullet.
PX%	Position of polar bear.
SC%	Score.
hit	Number of animals hit.

MAIN PROCEDURES

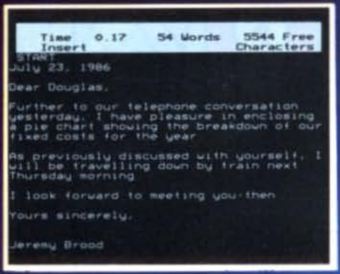
char	Reads user-defined characters for main game.
pchars	Reads user-defined characters for bonus game.
scr	Main screen display.
pscr	Bonus screen display.
code	Generates machine code.
fair	Moves animals.
fair2	Moves polar bear.



```
10 REM Rondo By Tim Thornham
20 REM (c) The Micro User
30 IFPAGE<>&E00THEN2560
40 MODE2:VDU23;8202;0;0;0;
50 PROCsetup:PROCcode
60 PROCnew
70 PROCchar:PROCset
80 PROCscr:PROCanim
90 REPEAT
100 T%=T%+1
110 PROCfair:PROCman:PROCbullet
120 IF T%MOD80=0:PROCnbon(RND(2)-1)
130 UNTIL (B%<1 AND flag=0) OR hit=
42
  140 IF hit<42:VDU4:COLOUR3:PRINTTAB
(6,18);"GAME OVER":PROCdel(4000):GOTO
60
  150 ST%=ST%+1:PROCdel(1000)
  160 PROCpchars:PROCpscr
  170 REPEAT
  180 PROCfair2:PROCman
  190 IFF%=X%:PROCdel(30)
  200 PROCbullet
```

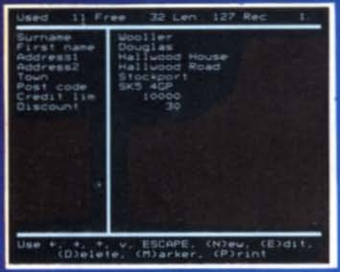
Turn to Page 142

All this in just



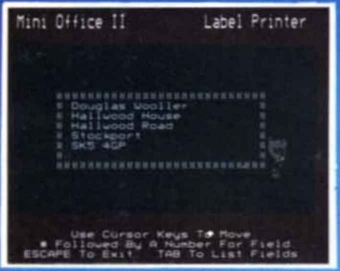
```
   Time    0.17     54 Words   5544 Free
   Insert                     Characters
 START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

I look forward to meeting you then

Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



```
Used   11 Free   32 Len  127 Rec    1
Surname         Wooller
First name      Douglas
Address1        Hallwood House
Address2        Hallwood Road
Town            Stockport
Post code       SK5 4GP
Credit lim         10000
Discount              30

Use ←, →, ↑, ↓, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE
Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II              Label Printer


      ################################
      # Douglas Wooller              #
      # Hallwood House               #
      # Hallwood Road                #
      # Stockport                    #
      # SK5 4GP                      #
      #                              #
      ################################


         Use Cursor Keys To Move
    # Followed By A Number For Field
  ESCAPE To Exit    TAB To List Fields
```

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

70
60
50
40
30
20
10
0
J F M A M J J A
PRODUCTION COSTS
cub
DATABASE SOFTWARE
Mini Office
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose
then press RETURN
(c) Database Software 1986

...and at a price

Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

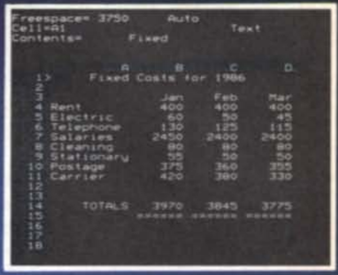
This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

ONE package!

CUMANA
Graphics

SPREADSHEET

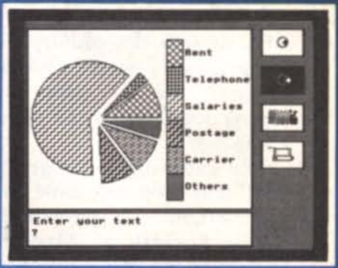
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



```
Freespace= 3750      Auto
Cell=A1                    Text
Contents=       Fixed

              A        B        C        D
  1>      Fixed Costs for 1986
  2
  3                    Jan      Feb      Mar
  4 Rent               400      400      400
  5 Electric            60       50       45
  6 Telephone          130      125      115
  7 Salaries          2450     2400     2400
  8 Cleaning            80       80       80
  9 Stationary          55       50       50
 10 Postage            375      360      355
 11 Carrier            420      380      330
 12
 13
 14       TOTALS      3970     3845     3775
 15                 ====== ====== ======
 16
 17
 18
```

GRAPHICS

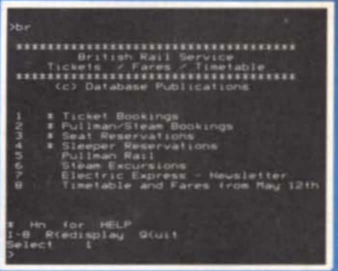
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



```
Enter your text
?
```

COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

 ****************************************
         British Rail Service
     Tickets  / Fares / Timetable
 ****************************************
       (c) Database Publications


 1    * Ticket Bookings
 2    * Pullman/Steam Bookings
 3    * Seat Reservations
 4    * Sleeper Reservations
 5      Pullman Rail
 6      Steam Excursions
 7      Electric Express - Newsletter
 8      Timetable and Fares from May 12th


* Hn  for  HELP
1-8  R(edisplay  Q(uit
Select    1
>
```

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

BBC Model B and B+

Cassette	*£14.95*
5¼" disc	*£16.95*

The original Mini Office has been recognised as an astonishing bargain for anyone looking for a low-cost introduction to serious software. Now the four programs which made it up have been substantially enhanced and two new programs have been added. The result, Mini Office II, is more than just an introduction to serious software applications. It's good enough to fulfill the entire software needs of many a small business! . . . The range of features in each program is astonishing for a package of this cost . . . The spreadsheet is every bit as good as a program such as MasterCalc which costs more than the entire Mini Office II . . . This delightful little program [Graphics] allows you to produce professional looking charts to illustrate a set of figures. – **Amstrad Action**

The word processor is literally overflowing with excellent features . . . The database is very easy to use yet extremely powerful . . . The spreadsheet program is the next little gem . . . Having used Mini Office II for the past few days I cannot praise it too highly. – **Popular Computing Weekly**

DATABASE SOFTWARE

Order form on Page 159

SOFTWARE specially written for the BBC Micro is playing its part in a campaign which could save up to 20,000 lives annually in the UK.

Each year 60,000 Britons die suddenly – 80 per cent of them at home – yet experts say one third of the victims could survive if they received proper attention right away.

The current Save a Life campaign aims to teach everyone in the country what to do to help in a life-or-death emergency.

As a contribution to the campaign's resource material, consultant anaesthetist Dr Peter Burridge has devised a BBC Micro program called Emergency First Aid – and it is the subject of this special Micro User report.

SAVE A LIFE

By PETER DAVIDSON

ALL around the country, lives are being saved by people who have been taught how to cope with an emergency through the Save a Life Campaign.

The campaign – programmes on BBC television and short courses all over Britain – is promoted by the Royal Society of Medicine and backed by the BBC. And now a program is available for the BBC Micro to teach the essentials of emergency first aid.

Two versions of this multiple choice question test are available – text only and disc. The latter contains several saved screens and an amended version of the program that calls a screen loading program several times as it runs.

Both are written fully in Basic and as the text version is far shorter you are encouraged to copy it and spread it around as much as possible.

There are several places where a slight amendment in screen layout or a rephrased question would improve the program, but this does not detract from the message it carries.

The authors' philosophy is to ensure that as many people as possible are educated in simple life-saving techniques. As our contribution, we have included a copy on this month's tape and disc from *The Micro User*, and a copy is available on MicroLink for free downloading. It can also be obtained from Dr Burridge on cassette.

The disc version (reviewed here), is only available directly from Dr Burridge. It contains the same text but has the added interest of pictures, some of which are animated.

When you boot the disc you are presented with a Mode 7 title screen. This is clear and bright, but I was baffled by a reference to the term CPR.

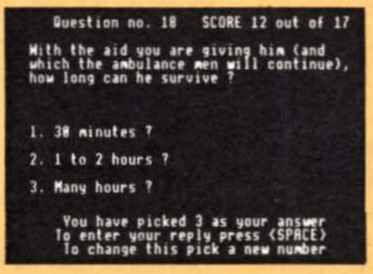
Perhaps I should have read the sheet of instructions that accompanies the program first, because it mentions that CPR is cardiopulmonary resuscitation. This is the only medical term I noticed and loosely translated it means heart and lung revival.

The instruction sheet sets the scene for the program and gives a few extra details.

However, the beauty of the program is its simplicity, and you don't need the written instructions to benefit from it.

Pressing the spacebar while the title screen is showing takes you to the next page, where a sample question and its responses shows the form that the test will take.

Each question has three alternative answers which often take the form of a correct one, a harmful one and one that does nothing. Pressing the spacebar again takes you to a demonstration picture which illustrates the sample question.



```
   Question no. 18   SCORE 12 out of 17

With the aid you are giving him (and
which the ambulance men will continue),
how long can he survive ?



1. 30 minutes ?

2. 1 to 2 hours ?

3. Many hours ?

     You have picked 3 as your answer
    To enter your reply press <SPACE>
     To change this pick a new number
```

Another press takes you to the start of the test and a page that sets the scene:

"You are in a busy chain store on a Saturday afternoon when suddenly a shopper next to you collapses and falls to the floor. After a call for help, how do you assess the casualty?"

The 15 questions that follow lead you through the series of actions that you should take if you are ever in this position, starting with one that simply asks what you should check.

Your possible responses are whether the victim can walk, if he is conscious or if he has wet his trousers.

A correct answer results in a high pitched sound while a wrong one produces a low note.

In either case you are then presented with a screen that says whether you were right or wrong, gives your score as a percentage of the questions answered and gives further details of the action you should have taken.

The facts that you are given on this reinforcement screen are exactly the same whether you answer correctly or not.

The extra details that accompany the first question end with the statement: "If the man is unconscious you must start the ABC routine without delay!"

By the time you have completed the test you will have discovered the meaning of ABC. But being an impatient type, I would have liked to have found out then and there that it stands for Airway, Breathing and Circulation.

Another press of the spacebar while this is being displayed takes you to a picture that emphasises the fact that you should gently shake the subject and shout: "Are you all right?".

All the questions take a similar form to the one already described, though some have animated pictures. These, for topics such as mouth-to-mouth resuscitation, are achieved by switching logical colours of two images on a Mode 2 screen.

Although they are elementary monochrome images they certainly emphasise the point well.

As the test progresses you are kept informed of the question number and score. Between questions you are given a rating in the form of a percentage as you get further hints about how to save a life.

The last question is followed by several screens of information about how more lives could be saved, and the final screen gives details of how you can find more details of practical classes organised as part of the Save-a-Life campaign.

The main program is quite long and there is insufficient free memory for a Mode 2 screen. To overcome this, when a picture is to be displayed a short screen loading program is run and the main program reloaded after you have viewed the picture.

This means delays during loading and reloading, but in most cases the wait is worthwhile and the pictures illustrate the points well.

I found the sounds useful to distinguish right and wrong answers, but I can envisage situations – the classroom, for example – where it could be annoying.

However, it is easy enough to enter *FX210,1 before loading the program and then running it using *EXEC !BOOT. If sound is never required the FX call could be incorporated into the boot file.

It's a long time since I did life saving at school, but I found I had remembered the basics. Thus a lot of the content of this program was purely revision, but I also found things to learn.

I would like to have seen more interaction with the computer, such as different response screens dependent on my answers, but the memory is full of useful information and the inclusion of such a facility would be very difficult at this stage.

Emergency First Aid is excellent value for money and provides valuable information. A lot of time and effort has been put into producing a very useful program that no software collection, whether at home or school, should be without.

EVEN as a doctor experienced in resuscitation techniques you hope not to be faced with a person who has suddenly collapsed in the street, *writes consultant surgeon Rory McCloy*.

What did I do with my stethoscope? Where is the ECG machine and the anaesthesist with a ventilator? What should I do first?

Before you run for it, have a go at this simple computer assisted learning program.

Dr Peter Burridge has managed to combine simple questions which put you on the spot with answers that educate. The text pages contain just enough information without being too long-winded and medical jargon is avoided.

The graphics show how to position the patient and perform mouth-to-mouth resuscitation and heart massage.

The timing of the animated sequences is accurate and is very helpful in judging how fast, how slow, how far and exactly where to press on the chest during heart massage.

My favourite animation is when the life-saver suddenly changes to give a mouth-to-mouth breath after completing 15 compressions of the chest. He goes on doing it for as long as you want to watch, emphasising one of Dr Burridges messages – "Don't give up".

After answering all the questions I was hoping for a graphic display showing my patient getting up and walking away – another life saved – but I was disappointed. Still, I have to admit I did get one answer wrong.

The moral is that everyone can learn something from a few minutes spent with this demonstration, and perhaps save a life as a result.

Program: Emergency First Aid
Price: £3 (40 or 80 track disc with illustrations), £3 (text only cassette)
Available from: Dr P. M. Burridge, Consultant Anaesthetist, Copeland Office, Birch Hill Hospital, Rochdale, Lancs, OL12 9QB. Tel: 0706 77777

How it all began

THE idea of writing a program for the BBC Micro to teach the essentials of emergency first aid evolved slowly over about 18 months.

The multiple choice question format used was originally downloaded from the free FASTT notice board, on Prestel, of the Faculty of Anaesthetists at the Royal College of Surgeons in London.

Designed on an Apple and later modified to run on BBC Micros, the programs were long, complicated and full of medical jargon. They ran slowly with text in capital letters only.

They were primarily intended for educating doctors on complex medical and surgical problems – to adapt them and use them for teaching needed considerable motivation and meticulous attention to detail.

By Dr PETER BURRIDGE

My interest was aroused by an item in the medical press about a year ago on the Resuscitation Council – the doctors behind the Save-A-Life Campaign.

This focussed on the need to improve the standards of resuscitation skills at all levels. It was apparent that all tiers of emergency helpers – from the general public to hospital consultants – could improve their skills.

This motivated me to try to help with the campaign. My first success was to have a questionnaire printed in the Rochdale Observer, with the intention of stimulating thought and showing people that there is a lot they should learn.

I achieved this when the newspaper ran a set of multiple choice questions dreamt up mainly by student nurses and their teachers in Rochdale, especially nurse tutor Jacqui Hawkrigg.

It seemed plausible to fit this test into the program format that we

→

From Page 37

already had for the BBC Micro, and we could add background information between the questions.

We always knew it would be better if pictures and sound could be incorporated, but did not have the requisite expertise – until we met up with Andy Rennison, a radiography tutor at the same hospital as myself.

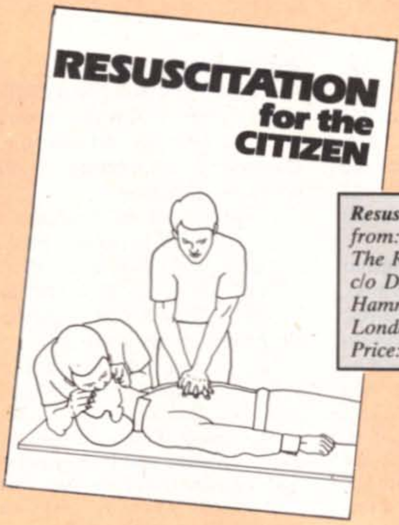
He completely re-wrote the program, using only ideas from the original FASTT software. And so our program – Emergency First Aid – was born.

Our philosophy was to leave everything completely accessible, so that the text driver can be easily used to teach any subject by changing its data statements.

To be useful to everyone, both at home and in educational establishments, we realised that Emergency First Aid must be able to run on all BBC Micros, from a model B with cassette or single 40 track disc drive upwards.

The next stage of the program's development was to add some pictures and we obtained permission to use illustrations from the booklet Resuscitation for the Citizen published by the Resuscitation Council.

The main problem was how to quickly get the pictures from the booklet into the micro, and this was solved using a Watford Electronics Beeb Video Digitizer.



Resuscitation for the Citizen, obtainable from:
The Resuscitation Council,
c/o Dept of Anaesthesia,
Hammersmith Hospital,
London
Price: 75p

Andy wrote a suite of machine code programs to clean up our images and with the aid of this powerful tool, simple artistic line drawings were easily transferred to the micro.

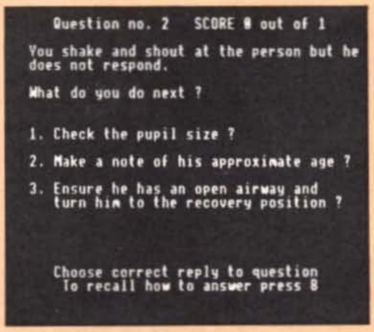
We chose mode 2 so that four monochrome images could be held in one 20k screen at once, showing the pictures one at a time by switching the logical and actual colours.

This gave us the facility to get the maximum number on to one disc without compressing the pictures – minor changes were then made using a graphics creation program.

We envisage several future developments. A compacter to store a Mode 2 screen in 6k instead of 20k will add more flexibility but at the cost of only animating three images at once. An un-compacter would then be necessary with every picture shown, but this could prove too slow.

Further techniques we would like to exploit are compacted Mode 1 screens to make use of the higher resolution, and Mode 4 ram switching for faster animation.

We are acutely aware that this program must grab and keep the attention of both adults and children for 15 to 20 minutes. The extra seconds waiting for pictures to load can become frustrating when they delay you the twentieth time.



```
      Question no. 2   SCORE 0 out of 1

   You shake and shout at the person but he
   does not respond.

   What do you do next ?


   1. Check the pupil size ?

   2. Make a note of his approximate age ?

   3. Ensure he has an open airway and
      turn him to the recovery position ?



      Choose correct reply to question
       To recall how to answer press 8
```

Anyone wanting a copy of the program can obtain one from me for £3, and as further developments are made to the software, I will update the discs for a nominal charge.

Finally, if anyone has ideas for improvements to the package, or offers of help, please feel free to contact me. ■

EVERYBODY, and I really mean everybody, should be able to perform mouth to mouth breathing and heart massage, *writes student health physician Jim Notman.*

These important aspects of first aid are not only easy to learn and perform but are also highly effective in being able to prevent lives being lost.

It is no good wishing you had learned these techniques after someone has collapsed at your feet. The time to learn the basics of first aid is now.

This program serves as an excellent introduction and the 15 to 20 minutes spent with it is well worth the effort.

The instruction is simple, informative and does not try to bamboozle you with unnecessary jargon. Questions help to reinforce the learning and a score is kept to show you how you are doing.

Diagrams form a useful and necessary part of the program showing the position in which a casualty should be placed, where to feel for a pulse, and animated diagrams show how mouth to mouth breathing and heart massage should be performed.

The great advantage of a self instruction package like this is that you can go at your own pace and repeat the program as often as you feel necessary.

This program must be seen by a wide audience, from individuals wanting to learn for the first time, to experienced first aiders who just need a reminder. As most schools have BBC Micros, it should be a requirement for all schools.

I only wish that a program like this had been available before now and hope it will help, in the words of the current campaign, to Save a Life.

6502 MACHINE CODE

Part XII

CMP, a useful way of checking out the accumulator

LAST month we met SBC, the 6502's subtraction instruction. As you can see from the mnemonic, Carry is very much bound up in what's happening. We found that to get the right answer in a subtraction, we had to set the Carry flag before the SBC and take account of its state afterwards.

Our use of subtraction is not always confined to sums as such – we often use it to find out about what's in the accumulator rather than to arrive at a particular figure as an answer.

Program I for instance uses subtraction to check for an asterisk being input. The idea is that we echo the characters input to the screen, finishing after an asterisk.

We input the character we want with:

JSR osrdch

This waits for a key to be pressed, then stores its Ascii value in the accumulator – leaving Carry clear if there are no problems. We'll go into this a bit more later. For the time being don't press Escape – this would cause problems!

```
 10 REM PROGRAM I
 20 oswrch=&FFEE
 30 osrdch=&FFE0
 40 FOR pass%=0 TO 3 STEP 3
 50 P%=&900
 60 [
 70 DPT pass%
 80 .start JSR osrdch
 90 JSR oswrch
100 SEC
110 SBC #&2A
120 BNE start
130 RTS
140 ]
150 NEXT pass%
160 CALL start
```

Program I

Echoing is simply achieved with:

JSR osrdch
JSR oswrch

oswrch leaves the contents of A unchanged, so we can now check it for the code for asterisk (&2A). To do this, we subtract &2A from the contents of the accumulator and check the Zero flag, branching back to the start if it's not equal to zero – that is, the code in the accumulator isn't &2A.

By MIKE BIBBY

If the character entered was an asterisk the sum would boil down to &2A–&2A, setting the zero flag. We then don't take the branch but drop through to the RTS.

Though this works fine, there are problems in using subtraction like this: SBC alters the contents of the accumulator. That is alright in this case, since we've already echoed the character input to the screen.

However, as you'll have noticed, the terminating asterisk is also printed. This is because the test is done after the call to *oswrch* is made.

If we wanted to avoid printing this asterisk, we'd put our test **before** we printed it. Unfortunately, since our test destroys the contents of the accumulator, this isn't straightforward – we'd have to add back the &2A we've taken away.

We can get round this by using the CMP instruction. This makes the 6502 do the subtraction "in its head" – that is, it changes the flags as if it were actually doing the subtraction, but doesn't do anything to the contents of the accumulator.

It may seem a little odd having a subtraction that isn't – but it comes in very handy for learning about what's in the accumulator.

For instance, if the accumulator already has &2A in it then:

CMP # &2A

would set the Zero flag, thanks to the imaginary subtraction, leaving the contents of the accumulator unchanged. That is, if afterwards Zero is set, we know that the accumulator does contain &2A.

Program II shows how to use CMP to directly replace the subtraction of the first program. Notice that we're using immediate addressing, hence the hash. Things work exactly as before, except that the contents of the accumulator aren't altered by the test.

```
 10 REM PROGRAM II
 20 oswrch=&FFEE
 30 osrdch=&FFE0
 40 asterisk=&2A
 50 FOR pass%=0 TO 3 STEP 3
 60 P%=&900
 70 [
 80 OPT pass%
 90 .start JSR osrdch
100 JSR oswrch
110 CMP # asterisk
120 BNE start
130 RTS
140 ]
150 NEXT pass%
160 CALL start
```

Program II

Program III proves this by placing the test before the printing. If the accumulator does contain &2A the CMP sets the Zero flag and the branch is taken to the RTS of *finish*. Notice that the asterisk isn't printed out.

If on the other hand the accumu-

→

From Page 39

lator doesn't contain the Ascii code for an asterisk, the Zero flag is clear and we drop through to:

JSR oswrch
JMP start

That jump loops us back to the beginning once more to wait for another keypress, which is what we want, since we haven't encountered an asterisk.

```
10 REM PROGRAM III
20 oswrch=&FFEE
30 osrdch=&FFE0
40 asterisk=&2A
50 FOR pass%=0 TO 3 STEP 3
60 P%=&900
70 [
80 OPT pass%
90 .start JSR osrdch
100 CMP # asterisk
110 BEQ finish
120 JSR oswrch
130 JMP start
140 .finish RTS
150 ]
160 NEXT pass%
170 CALL start
```

Program III

So far we've avoided the question of what happens when you press Escape. Program IV is an adaptation of Program II catering for the Escape key, using an osbyte routine.

These osbyte routines are a collection of ready-made machine code programs in the BBC Micro's operating system. We've already used operating system calls like this – oswrch and osrdch.

Osbytes are different though, in that the machine code that handles them all starts at &FFF4, but the actual code that does the work – and the effect it has – depends on the value in the accumulator when it's called. Often additional parameters are supplied via the X and Y registers.

Actually you've almost certainly met osbytes before, as BBC Basic's *FX calls. When Basic encounters a *FX call it hands it over to the operating system. This in turn transfers the figure following the *FX to the A register, any other parameters to the X and Y registers, and calls the routine at &FFF4.

For instance:

***FX 12,4**

would change the auto-repeat period to four hundredths of a second. The Y register defaults to zero. Its machine code equivalent would be:

LDA # 12
LDX # 4
LDY # 0
JSR &FFF4

Full details of the osbyte calls are to be found in the Advanced User Guide by Bray, Dickens and Holmes. Master series owners will also find them described in the Acorn Master Reference Guide Part One.

We're interested in osbyte &7E which is an operating system housekeeping routine to acknowledge Escape being pressed.

Normally osrdch loads the Ascii value of the key pressed to the accumulator and clears Carry. If Escape has been pressed though, there are problems. Osrdch sets Carry to signal this and returns 27 in the accumulator.

We then need to acknowledge this Escape with osbyte &7E, which also flushes the current buffers and closes any open EXEC files.

```
10 REM PROGRAM IV
20 oswrch=&FFEE
30 osrdch=&FFE0
40 osbyte=&FFF4
50 asterisk=&2A
55 beep=&07
60 FOR pass%=0 TO 3 STEP 3
70 P%=&900
80 [
90 OPT pass%
100 .start JSR osrdch
110 BCS error
120 JSR oswrch
130 CMP # asterisk
140 BNE start
150 RTS
160 .error LDA # &7E
170 JSR osbyte
171 LDA # beep
172 JSR oswrch
180 RTS
190 ]
200 NEXT pass%
210 CALL start
```

Program IV

Program IV handles this by checking for Carry being set after the call to *osrdch*. If so it branches to the subroutine *error* which calls osbyte &7E and gives us a beep before returning.

To save space, I'll generally omit this Escape handler from my routines – after all, its easy enough for you to keep your fingers away from the Escape key. However, be sure to include it in any serious software you write.

Similar to CMP are CPX and CPY which compare the operand with the X and Y registers respectively. We often use these registers as indices or counters. Program V shows how to use them to print out a row of 10 asterisks. It shouldn't be too difficult to see what's going on. We increase the contents of X after each call to *oswrch*, then compare it with *number*. When they're equal, the Zero flag is set and we drop through the BNE to our final RTS.

```
10 REM PROGRAM V
20 oswrch=&FFEE
30 asterisk=&2A
40 number=10
50 FOR pass%=0 TO 3 STEP 3
60 P%=&900
70 [
80 OPT pass%
90 .start LDX # 0
100 LDA # asterisk
110 .print JSR oswrch
120 INX
130 CPX # number
140 BNE print
150 RTS
160 ]
170 NEXT pass%
180 CALL start
```

Program V

The only thing that might cause you to ponder a bit is how we arrive at the value 10 for *number*. Well in our loop *print*, the branch test comes **after** the INX. This means we print an asterisk for X holding 0, then 1, 2 and so on up to 9. We then INX once more which takes X to 10, so we drop out of the loop. We've then printed asterisks for X holding 0 to 9 – ten asterisks.

You might like to try setting *number* to zero in line 40 and then running the program. Can you see what's going on? While you're at it you might also rewrite this so that it uses the Y register.

In practice you're much better counting down and omitting the compare altogether, using a loop such as:

.print JSR oswrch
DEX
BNE print

What value would *number* have to have then in order to print out 10 asterisks?

The most useful property of CMP, CPX and CPY is the way they affect the Carry flag:

If the register contents are greater than OR equal to the operand Carry is set. If the register contents are less than the operand Carry is clear.

In other words, CMP decides which of two ranges the register contents fall into and sets the Carry flag accordingly:

register >= operand	**Carry set**
register < operand	**Carry clear**

Remember, the micro is setting the flags according to the results of:

register-operand

So if the register is less than the operand, we get a "negative" result and Carry is cleared. Note how, with compare, we use the Zero flag to test for a specific value in the register and the Carry flag to test for a range.

In Program VI we use our admittedly inefficient technique of counting up to print out 10 asterisks. This time we branch on the Carry flag. As the value of X increases from 0 to 9, the CPX clears Carry each time and the branch (BCC) is taken.

After printing asterisk 9, however, the INX takes X to 10; the operand then equals the register, Carry is set for the first time and we drop through the loop.

What happens this time if you set *number* to zero?

We often use CMP to filter input, ensuring that it lies within a certain range. For instance we could just want numeric keys to be pressed. Program VII is testing for upper case alphabetic keys (A to Z), echoing them back until an asterisk is entered.

The main routine, *input* starts with a call to *osrdch*. We test this immediately with:

CMP # asterisk
BEQ finish

If the character in the accumulator passes this scrutiny we then check that it's in the set of upper case alphabetic characters. To do this we check that:

- The character's code is equal to that for A or greater
- The character's code is that for Z or less.

If both these are true, the number in the accumulator must correspond to the Ascii code for A to Z. Think about it....

Test 1 is simple: We make the operand the Ascii code for A and branch back to *input* – that is, don't print the character entered – if Carry is clear: The register value is less than the Ascii for A.

```
 10 REM PROGRAM VI
 20 oswrch=&FFEE
 30 asterisk=&2A
 40 number=10
 50 FOR pass%=0 TO 3 STEP 3
 60 P%=&900
 70 [
 80 OPT pass%
 90 .start LDX # 0
100 LDA # asterisk
110 .print JSR oswrch
120 INX
130 CPX # number
140 BCC print
150 RTS
160 ]
170 NEXT pass%
180 CALL start
```

Program VI

If it passes this test, there's still the possibility that the character is out of range at the "other end". Test 2 caters for this.

The 6502 hasn't got a test for a register being equal or less than a target number, only for less. Undeterred, we simply test it for being less than "the next one up" from that target. If that's so, the register's equal to the target or less!

After all, asking for numbers that are equal to or less than 9 is the same as just asking for numbers less than 10 – and the 6502 has a test for the latter.

In this case we compare the accumulator with ASC ("Z")+1. If Carry is set, the number in the register must be greater or equal to this. Either way we don't want it, so we branch back to *input* for a fresh character. The code that achieves this is:

CMP # ASC("Z")+1
BCS input

If it gets through all our checks, the number in the accumulator must be the Ascii value of a character in the required range, so we drop through into the routine *print* and then jump back to *input*.

Notice that this last jump means there's only one way out of the program when its running – by entering an asterisk.

And that's all for this month. To get some practice using CMP, try converting Program VII so that it only accepts decimal digits. And if you're really ambitious try fixing it so it only allows hexadecimal digits – you'll need a few more comparisons!

```
 10 REM PROGRAM VII
 20 oswrch=&FFEE
 30 osrdch=&FFE0
 40 asterisk=&2A
 50 FOR pass%=0 TO 3 STEP 3
 60 P%=&900
 70 [
 80 OPT pass%
 90 .input JSR osrdch
100 CMP # asterisk
110 BEQ finish
120 CMP # ASC("A")
130 BCC input
140 CMP # (ASC("Z")+1)
150 BCS input
160 .print JSR oswrch
170 JMP input
180 .finish RTS
190 ]
200 NEXT pass%
210 CALL input
```

Program VII

● *Next month we'll take a look at indexed addressing, a powerful programing technique.*

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Word processing comes to China via the BBC Micro

By MIKE COWLEY

THE Chinese have been reported to be on the verge of the great leap forward into the 20th Century for more years than most people in the West can remember.

But with only 13 years still to go they still haven't made it.

Yet there are now indications that a real breakthrough is about to happen.

And the BBC Micro is playing a key role. For it is being used to develop the world's first effective Chinese word processor.

It's the brainchild of a Cambridge University lecturer in Chinese and his brilliant son who is a student at Hatfield Polytechnic.

Robert Sloss of Darwin College and Andrew, a 20-year-old in his second year of mechanical engineering, currently lead the world in that they have managed to get 14,000 Chinese characters on to two floppy discs.

And more importantly they have designed a keyboard which will satisfy both the cultural and commercial demands of that country.

To the Western observer used to modern offices, this may not seem of momentous importance. But to the people of China it may well eventually prove as significant as inventing the wheel.

The mere fact that the Chinese language will be available on a micro will have greater consequences for the country than the Long March and the Cultural Revolution combined.

It is already being seen as the key to satisfying the demand for change in China.

And with more than 70 per cent of the population in the teeming cities now huddled in front of State-provided television sets each evening, the groundswell for change is now being dictated by the people themselves.

Though few Western programmes are shown, those that have been have proved sufficient to whet the appetites of the native Chinese for a better life-style.

Yet despite the apparent appreciation of this fact by the current government of the People's Republic, little headway is possible for the moment because of a lack of hard currency.

This year's Peking phone directory reflects the problem. While the city is a critically important business centre and is home to more than seven million Chinese, there are only 53,000 numbers listed.

Once a great trading nation, China has been frustrated in its attempts to repeat its once glorious merchant past – and so accumulate vital overseas currency – mainly because of its native tongue.

Such is the complexity of modern international business that the need to communicate quickly and effectively is of critical importance.

Unfortunately the Chinese language has been a major barrier to this ever since the days of barter were left behind.

When the telegraph lines first came to China, the problem needing to be overcome was that morse – the system under which it operated – worked on letters and numerals.

The only way it was possible to get round this – and it wasn't entirely successful – was to take some 10,000 characters and turn them into code. This was then transmitted from one end and decoded the other, with some amazingly garbled results.

During the civil war, nationalist troops found themselves shelling their own forces on several occasions because of linguistic hiccups in telegraphic communications.

To this day, because each character in their language stands for a word and not a sound, the Chinese still do not have any effective form of typewriter.

In fact there have been virtually no advances in the field since the first machine – invented by a Japanese – was introduced back in the 1920s.

Made up of around 2,000 slugs of type on a matrix, each one has a character on top not only wrong way round but upside down.

So the Chinese secretary at the hub of the country's most modern offices must face the fact that her typing speed will be limited to 10 words a minute.

It is little wonder then that most transactions in China – particularly those connected with government departments and finance – still involve handwritten documents.

As a Chinese scholar of distinction, Robert Sloss is well aware of the great puzzle the language poses.

"You are dealing with part of the world which developed on its own", he says.

"As a result, not only is Chinese significantly different from any other language but it tends to make the Chinese themselves think differently.

"With the Chinese character being a visual symbol for an idea, it seems that there is a different part of the brain that deals with it.

"This is supported by evidence that people who are dyslexic in English can read Chinese. So it would appear it involves a different mental process".

However, the main problem faced by anyone attempting to develop a Chinese word processor – as the father and son team well appreciate – is the number of characters in the language.

Unlike English and tongues with similar roots which have 26 letters in the alphabet, Chinese has thousands of characters.

Yet before the Sloss team came on the scene with their Chinese word

Robert Sloss and his son Andrew with a Chinese keyboard used in their work. There are thousands of characters on the drum

processor project, all previous work in this area has almost always been based on QWERTY style keyboards.

Back in 1982, the Chinese were reported to be evaluating more than 200 schemes for encoding Chinese characters – all of them involving Western language applications.

This, according to Robert Sloss, is in fact where they had all gone wrong.

"Everybody seems to think the QWERTY keyboard had been created by God", he says. "Yet it's an entirely illogical thing for Chinese.

"And more important is that a Western style keyboard would not be accepted by the Chinese themselves".

So the first area to which they directed their attention was a purpose-designed keyboard.

The end product – a revolving drum around which the matrice is wrapped – may look rather crude in high-tech terms but it works.

As the operator is able to use two hands, it enables an output of 40 to 50 characters a minute which translates into a fast typing speed.

It was only after they had developed the revolving keyboard concept that the Cambridge lecturer and his son discovered that a similar technique had been developed by the Chinese for typesetting centuries ago.

"Once we had this up and running, we were on our way", says Robert Sloss.

The target he and his son have set themselves is to eventually produce a simple and inexpensive means for desktop publication of print-quality Chinese employing BBC Micros interfaced with purpose designed keyboards.

"Implicit in this aim", insists Robert Sloss, "is the development of the capability to perform with equal ease in Chinese those tasks which can be undertaken currrently in Western languages using microcomputer equipment".

The university lecturer was able to approach the project with a unique set of qualifications.

A former Wing Commander in the RAF – where he spent three years learning Chinese – he went on to become Commandant of the Ministry of Defence Language School in Hong Kong.

He subsequently departed for Cambridge to direct the 1970s work of the Chinese Language Project, a small research unit in the faculty of Oriental Studies.

It was this project which resulted in the development of a system for inputting, storing and retrieving Chinese characters in their original forms.

Because of the numbers and complexity of these characters, the solution adopted was to make digital X-Y pairs from the positions of a frequency-selected subset of characters placed in a matrix.

While there have been many solutions proposed since then, the Cambridge one remains the simplest and most flexible means for achieving this result.

It has been successfully used for a number of years to compile Chinese lexical databases and to perform other linguistic computing tasks when interfaced with the Cambridge mainframe.

But Robert Sloss was not content for it to end there.

"As time has gone on, it has become increasingly apparent that the full exploitation of this approach to Chinese data processing is dependent on the implementation of an equally simple and flexible means for handling this data in a microcomputer environment", he says.

And this is where son Andrew came into his own.

For the student is a whizz kid on the BBC Micro.

"All I did then was pose the questions and he came up with the answers on the micro", says Robert Sloss.

It also helped that Andrew has studied Chinese as an 'A' level subject before going to the polytechnic.

Combining this with his computer skills, Andrew achieved his first major breakthrough with a series of innovative compression programs.

These meant that the drawing instructions for the 14,000 characters held on the Cambridge University mainframe set can be rapidly accessed on demand by the BBC Micro, from two floppy discs.

Not content with this, he has since perfected software for the creation and manipulation of additional characters.

And he has even developed a text editor for Chinese characters with functions similar to that of a word processor for Western language text.

Because he carefully monitors what is happening in China, Robert Sloss is acutely aware of what the successful conclusion of the project could mean.

"The Chinese are the first to appreciate the potential in this for their country", he says.

"It could in turn mean a lot for Acorn. For it could establish its machines in what is likely to be the world's largest market.

"Then the BBC Micro would certainly be remembered as the machine that dragged the Chinese into the 20th Century . . ." ■

A crash course in collision detection

ROLAND WADDILOVE reveals two common methods of collision detection – PEEK and EOR

IN this series we are developing some of the basic techniques involved when writing machine code games.

These are not beginners articles and I'm assuming you have read Kevin Edwards' excellent introduction to machine code games in the earlier issues of *The Micro User* that I mentioned last month.

In that article we looked at sprite animation and masking techniques. I showed how a sprite could be restricted to any portion of the screen and made to move in front of and behind objects.

Now we'll move on to collision detection and look at some of the most common techniques used in commercial software.

Enter and run this month's program. (If PAGE is greater than &1900 you'll have to relocate it to &1900 or less.) You'll see a menu with two options – PEEK and EOR. These are the two methods of collision detection we'll be discussing this month.

Press 1 or 2 and after a short pause the screen will clear and a ball will be printed on the screen just below the word BEEP!. You'll see a box drawn around the edge of the screen.

Using the cursor keys, move the ball and see what happens when you pass over the letters of the word or the box. You should hear a beep as the collision is detected.

Press Escape and re-run the program. Try both methods and notice the difference – peek does not always detect the collision but eor does.

Take a look at line 370 to see how these routines work – here's the code:

```
JSR collision
BEQ OK
LDA £7
JSR oswrch
.OK
```

The subroutine *collision* checks whether the ball has hit anything and returns with the zero flag set if everything is ok. If a collision has occurred Ascii 7 is output to acknowledge the fact.

In an arcade game you would probably jump to an explosion or the end of game routine. However, for this demonstration the beep will suffice.

Let's look at *collision* in detail and see how it works. Ignore the first line – 500. This merely flushes the sound buffer so the beep doesn't last too long.

MACHINE CODE GAMES

Part 2

A macro – FNbumped – combined with conditional assembly is used to select the type of collision routine to assemble. A flag is set in line 90 just after the menu and this is used in line 1370 to select either the peek or eor assembly code.

Peek is the shortest routine and starts at line 1390. The ball's address is stored in *address* and the simplest collision routine possible would just peek this screen address and see if the contents of the byte is what it should be – zero in our case.

Peek goes one further and looks at the top left and top right corners of the ball with:

```
LDY £0:LDA (address),Y
LDY £32:ORA (address),Y
```

If either of these two bytes are non-zero then a collision has occurred.

The point to note is that this routine simply looks at two bytes of the sprite and completely misses the rest which may have hit something.

This makes it a rather poor detection method but it does have it's uses. When we come to look at bouncing sprites you'll see how it can be put to good effect.

You could easily alter this simple routine to look above, below, to the left and right of the ball but it still wouldn't be perfect. You can see it's limitations if you try the demonstration.

The alternative method is EOR. While being a much superior method it takes far more code and is much slower.

The code starts at line 1480 and if you compare it to *print* you'll see it's quite similar. In fact it's just a modified print routine.

We looked at *print* last month and saw that to print the sprite the data is Exclusively ORed on to the screen. To remove it, the data is again EORed with the screen.

This EOR print method relies on the fact that if you take any number and EOR it with itself the result is zero. So, to move the sprite the data is again EORed with the screen and the old image is removed.

The print routine stores the character data in the screen memory so, if we EOR the data again with the screen memory the result should be zero.

To make this a little simpler to understand take the following list of numbers – it could be sprite data stored in the screen memory using *print*:

```
12,45,32,56,10
```

Now EOR each number with itself:

```
12 EOR 12 = 0
45 EOR 45 = 0
32 EOR 32 = 0
56 EOR 56 = 0
10 EOR 10 = 0
```

and the result each time is zero.

The EOR collision routine Exclusively ORs each byte of sprite data with the screen memory (but it doesn't store the result back in the memory). If any of the bytes are non-zero a collision must have occurred. You can see this in line 1560:

```
LDA (old),Y
BEQ zero
EOR (new),Y
BEQ zero
RTS
.zero
```

The routine returns immediately a non-zero result is found and the zero flag is zero. If there is no collision the routine returns with the zero flag set.

The line contains an additional refinement in that it only checks non-zero data bytes. So the empty space around the ball is ignored.

Lines 1480 to 1500 store the address of the sprite data in *old*, its screen address in *new* and load X and Y with the size. The collision routine proper starts at line 1510 and is a general subroutine which can be used with any sprite.

● *That just about wraps it up for this month. However, it's not the end of the story as next month we'll look at a totally different collision detection method. This will not involve looking at the screen – in fact the sprites don't even have to be on the screen!*

```
   10 REM Collision Detection
   20 REM By R.A.Waddilove
   30 REM (c) Micro User
   40 MODE6:*TV0,1
   50 FOR I%=0 TO 47
   60 READ J%:I%?&C00=J%
   70 NEXT
   80 PRINT'"Press (1)PEEK  (2)EOR";
   90 F%=GET-49:VDU7
  100 PROCassemble:CLEAR
  110 MODE 2:VDU 23;8202;0;0;0;
  120 VDU19,4,3;0;19,6,1;0;
  130 GCOL 0,5:MOVE 96,120:PLOT 17,0,780:PLOT 17,1068,0:PLOT 17,0,-780:PLOT 17,-1068,0
  140 COLOUR7:PRINT TAB(7,15)"BEEP!"
  150 CALL &900
  160 END
  170 
  180 DEF PROCassemble
  190 old=&70:new=&72
  200 rows=&74:columns=&75
  210 temp=&76:temp1=&78:temprows=&7A
  220 address=&80:x%=&82:y%=&83
  230 osbyte=&FFF4:oswrch=&FFEE
  240 FOR pass=0 TO 2 STEP 2
  250 P%=&900
  260 [ OPT pass
  270 
  280 .initialise
  290 LDA #&80:STA old:STA old+1  \set old address
  300 LDX #35:STX x%:LDY #160:STY y%  \set your x,y
  310 JSR convert  \get address
  320 LDA new:STA address:LDA new+1:STA address+1  \save address
  330 LDA data:STA newdata+1:LDA data+1:STA newdata+2  \set data
  340 LDX #4:LDY #12:JSR print
  350 
  360 .start
  370 JSR collision:BEQ OK:LDA #7:JSR oswrch  \BEEP!
  380 .OK
  390 LDA data:STA olddata+1:STA newdata+1:LDA data+1:STA olddata+2:STA newdata+2  \set data
  400 LDA address:STA old:LDA address+1:STA old+1  \set old
  410 JSR readkeys
  420 LDX x%:LDY y%:JSR convert  \get new address
  430 LDA new:STA address:LDA new+1:STA address+1  \save address
  440 LDA &240:.fx19 CLI:SEI:CMP &240:BEQ fx19
  450 LDX #4:LDY #12:JSR print
  460 LDA #&81:LDX #&0F:LDY #&FF:JSR osbyte:TYA:BEQ start  \Escape pressed?
  470 RTS  \return to Basic
  480 
  490 .collision
  500 LDA #21:LDX #7:JSR osbyte
  510 OPT FNbumped
  520 
  530 .readkeys  \right
  540 OPT FNinkey(-122):BEQ left
  550 INC x%:RTS
  560 .left
  570 OPT FNinkey(-26):BEQ up
  580 DEC x%:RTS
  590 .up
  600 OPT FNinkey(-58):BEQ down
  610 DEC y%:DEC y%:RTS
  620 .down
  630 OPT FNinkey(-42):BEQ nokey
  640 INC y%:INC y%
  650 .nokey RTS
  660 
  670 .put
  680 LDA #&80:STA old:STA old+1
  690 .print  \uses new/old/X=rows/Y=columns/olddata/newdata
  700 STX columns:STY rows
  710 LDX #0:LDY #0
  720 LDA new:STA temp1:LDA new+1:STA temp1+1
  730 LDA old:STA temp:LDA old+1:STA temp+1  \save address of column
  740 .loop1
  750 LDA rows:STA temprows
  760 .loop2
  770 .newdata LDA &3000,X:EOR (new),Y:STA (new),Y
  780 .olddata LDA &3000,X:EOR (old),Y:STA (old),Y
  790 INX:BNE noinc:INC olddata+2:INC newdata+2  \next data byte
  800 .noinc
  810 LDA old:AND #7:CMP #7:BEQ bottom1
  820 INC old:BNE next1:INC old+1:JMP next1
  830 .bottom1 \row
  840 CLC:LDA old:ADC #&79:STA old:LDA old+1:ADC #2:STA old+1
```

Turn to Page 138

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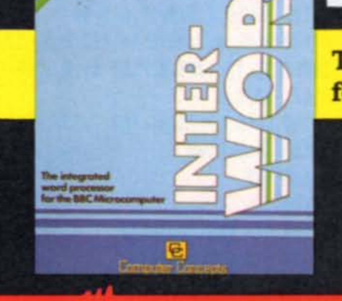

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Arrays: Entering another dimension

BEGIN
HERE
Part
14

By PETE BIBBY

IF you can cast your mind back as far as last autumn, you'll remember that we dealt with arrays. As we saw, these are ways of storing a set of related values using just one variable name followed by a number in brackets.

This number, the subscript or index, allowed us to pick out an individual value or element from the array. Program I shows an array being used to hold the names in Figure I, a diagram showing who sits where in a class. The desks are numbered 1 to 9 and the names are written on the desks (usually with a penknife).

```
 10 REM Program I
 20 space$="  "
 30 numberOfPupils=9
 40 DIM name$(numberOfPupils)
 50 FOR loop=1 TO numberOfPupils
 60 PRINT "who sits at desk ";loop
 70 INPUT name$(loop)
 80 NEXT loop
 90 PRINT
100 FOR loop=1 TO numberOfPupils
110 PRINT loop,space$;name$(loop)
120 NEXT loop
```

Program I

Program I shouldn't cause too many problems. Line 40 uses DIM to dimension an array called *name$()* which will have *numberOfPupils* elements.

Since *numberOfPupils* has been set to 9 by the previous line, this means that *name$()* has 9 elements. (Well, not quite. There's *name$(0)* but that's the black sheep of the array, never mentioned in company.)

Lines 50 to 80 form a FOR . . . NEXT loop with loop control variable *loop*. As this wends its way from 1 to 9 the body of the loop – lines 60 and 70 – ask you to enter the name of whoever is sitting at a particular desk number.

This is then stored in the element *name$(loop)*. From this it follows that the first time round the loop whatever you type in – hopefully Pete – will be entered in *name$(1)*.

The second time round *loop* has the value 2, so whatever you type in – from the diagram it should be Noreen – goes into *name$(2)* and so on.

By the time the loop has cycled nine times, all the names from the diagram should have been stored in the array *name$()*. The second FOR . . . NEXT loop confirms this by displaying the contents of the array along with the appropriate desk number.

If you're wondering what *space$* is for, it's just there to tidy up the output. I find it easier to use the string variable *space$* (which I know contains two spaces as I've created it in line 20) than to have odd gaps in my listing consisting of an unknown number of spaces.

Should you have any difficulty understanding the program, refresh your memory of arrays by looking at the Begin Here articles in the September, October and November 1986 issues of *The Micro User*.

```
 10 REM Program II
 20 space$="  "
 30 numberOfPupils=9
 40 DIM name$(numberOfPupils)
 50 FOR loop=1 TO numberOfPupils
 60 READ name$(loop)
 70 NEXT loop
 80 PRINT
 90 FOR loop=1 TO numberOfPupils
100 PRINT loop,space$;name$(loop)
110 NEXT loop
120 DATA Pete,Noreen,Colin
130 DATA "John","Phil","Lorraine"
140 DATA Nahid,Carole,Mike
```

Program II

I suspect that for most of you the real difficulty will come from all the typing involved in entering values into the array. And every time you run the program you have to go through the same process. Annoying, isn't it? Program II makes use of what we've learnt about READ and DATA to ease the load on your fingers.

For the most part, Program II is

→

Pete 1	Noreen 2	Colin 3
John 4	Phil 5	Lorraine 6
Nahid 7	Carole 8	Mike 9

Figure I: Who sits where

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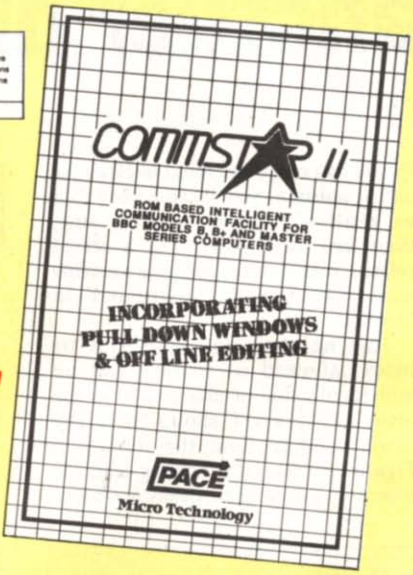
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From Page 49

the same as Program I. It consists of two FOR . . . NEXT loops and it produces a list of who sits where.

The big difference is that you don't have to type in the names every time you run the program. They're there already in the data lines from 120 to 140.

If you look at the first FOR . . . NEXT loop you see that there's a READ instead of the PRINT and INPUT of the earlier program. This is what saves the typing. And if you can't understand how it works a quick look at the last two articles in this series will help.

One thing that may cause you difficulty is line 130. Why are there inverted commas around the names in that line? The answer is that they're there to show you that you can have them. There's no other reason than a pedagogical imperative. (Look it up, I had to.)

You could just as easily have:

```
120 DATA John,Phil,Lorraine
```

and it would make no difference to the program. I prefer this second method as it avoids the danger of getting the punctuation mixed up.

However if your data strings begin or end with spaces or have a comma inside them, then the inverted commas are needed to tell the micro to treat everything inside them as one string. Try changing line 140 to:

```
140 DATA Nahid ,Carole,Mike, Fred
```

and see how it differs from:

```
140 DATA "Nahid ","Carole,Mike",
" Fred"
```

Presumably Carole and Mike are sharing a desk to make room for Fred.

Comparing the original data lines of Program II with Figure I, you'll see that each line corresponds to one of the rows of desks. Line 120 has the names of the people in row 1, line 130 those of row 2 and you can guess what line 140 holds.

The trouble is that the desk numbers, 1 to 9, are a bit awkward when it comes to figuring out who sits where. It's obvious from Figure I that the desks numbered 4 to 6 form the second row and 7 to 9 the third but which ones form the second column or the third? We could use lines like:

```
90 FOR loop=7 TO 9
```

or

```
90 FOR loop=2 TO 8 STEP 3
```

to tease out the information from our array but it does get a bit complicated. And there is a better method.

row column	1	2	3
1	Pete	Noreen	Colin
2	John	Phil	Lorraine
3	Nahid	Carole	Mike

Table I: An alternative who sits where

Table I, like Figure I, shows who sits where, only this time in tabular form using the row and column numbers of the desks. This does away with the need for a specific desk number, as you can refer to a desk by combining its row number and column number rather like a map reference.

```
10 REM Program III
20 DIM row1$(3),row2$(3),row3$(3)
30 FOR loop=1 TO 3
40 READ row1$(loop)
50 NEXT loop
60 FOR loop=1 TO 3
70 READ row2$(loop)
80 NEXT loop
90 FOR loop=1 TO 3
100 READ row3$(loop)
110 NEXT loop
120 FOR loop=1 TO 3
130 PRINT row1$(loop)
140 NEXT loop
150 DATA Pete,Noreen,Colin
160 DATA John,Phil,Lorraine
170 DATA Nahid,Carole,Mike
```

Program III

So while Figure I has Phil sitting at desk 5, Table I has him at the second desk in the second row. It's just an alternative way of looking at things. Either way Phil is still in the middle desk.

```
10 REM Program IV
20 DIM row1$(3),row2$(3),row3$(3)
30 FOR loop=1 TO 3
40 READ row1$(loop)
50 READ row2$(loop)
60 READ row3$(loop)
70 NEXT loop
80 FOR loop=1 TO 3
90 PRINT row2$(loop)
100 NEXT loop
110 DATA Pete,John,Nahid
120 DATA Noreen,Phil,Carole
130 DATA Colin,Lorraine,Mike
```

Program IV

Now it would be nice if we could use this scheme in a program. In other words, if we could locate a desk by first giving it a row number, then its column number.

Using this method Noreen would be found sitting at the desk in row 1, column 2 while Mike is at row 3, column 3 or the third desk along the third row. Program III uses three arrays, one for each row, to hold this information.

Despite the fact that Program III has four FOR . . . NEXT loops, it's not all that different from Program II. The extra loops come from the fact that we now have three arrays, one for each row in Table I.

The first FOR . . . NEXT loop reads the data for the first row into *row1$()*, the second into *row2$()* and I leave it to you to discover what the third FOR . . . NEXT loop does. The final loop just displays the names in the first row of desks.

So now we can refer to any of the rows by choosing the appropriate array from *row1$()*, *row2$()* and *row3$()*, and picking a particular desk by using its column number as the subscript (the bit in brackets). The trouble is that all those FOR . . . NEXT loops seems bit wasteful. Can you do the same job using just two? Congratulations, if you come up with something like Program IV as an answer.

This uses just one FOR . . . NEXT loop (lines 30 to 70) to read a

→

From Page 51

value into each of the three arrays. The first time round the loop *loop* is 1 and the data from line 100 is read into *row1$(1)*, *row2$(1)* and *row3$(1)*. I'll let you figure out what happens during the second and third cycles. And full marks if you saw that we can replace the three lines 40, 50 and 60 with a solitary:

```
40 READ row1$(loop),row2$(loop),
row3$(loop)
```

Notice that the order of the data in the data lines has had to be changed to allow for the three READs in the body of the loop. To my mind this makes the program a little less obvious. With Program III, inefficient though it was, it was easy to see that the first data line held the values to be read into *row1$()* and so on.

With Program IV this relationship, although there, isn't so obvious. The first data line holds the names in the first column rather than the row. It all works out the same, but I find it less understandable. And this seems to be a law of progamming – what we gain in efficiency is often lost in clarity.

```
10 REM Program V
20 DIM row1$(3),row2$(3),row3$(3)
30 FOR Down=1 TO 3
40 FOR loop=1 TO 3
50 READ rowDown$(loop)
60 NEXT loop
70 NEXT Down
80 FOR loop=1 TO 3
90 PRINT row2$(loop)
100 NEXT loop
110 DATA Pete,Noreen,Colin
120 DATA John,Phil,Lorraine
130 DATA Nahid,Carole,Mike
```

Program V

Having said all that, let's stick with Program IV and look at lines 30 to 70, the initial FOR . . . NEXT loop. Lines 40 to 60, the three READ commands, look almost identical. The only difference is in the numbers embedded in the array names.

Now a cunning programmer, armed with knowledge of nested FOR . . . NEXT loops, might wonder if these numbers – 1, 2 and 3 – could be replaced by a variable. This variable could then be used as the control variable of the outer of a pair of nested loops. Program V shows what this would mean.

At first sight this appears a pretty convincing bit of code. As the outer loop cycles, so *Down* will take the values 1, 2 and 3. For each cycle of the outer loop the inner loop cycles three times, with *loop* going from 1 to 3.

The theory is that the first time round the outer loop, with *Down* equal to 1, line 50 will read values into *row1$(1)*, *row1$(2)*, and *row1$(3)*. The second time round the outer loop *Down* is 2 and the intention is that the inner loop has values read into *row2$(1)* and so on.

That's the intention but it doesn't work, as you'll see if you try running the program. It stops and you get the message:

```
Array at line 50
```

The trouble is that although the idea of nested loops is a good one, we can't use *Down* in the way we wanted. The stem part of an element name (the bit before the brackets) can't vary, much as we'd like it to.

Because of this, when the micro comes across *rowDowns$()* it objects on the grounds that no such element has been DIMmed. In other words it takes a dim view of it. We know that we mean the micro to substitute the value of *Down* in *rowDown$()* but the micro won't do it for us. It's not allowed. And so Program V won't work.

This is a pity, because it was a good idea. It would be rather elegant to be able to read values into the array row by row, column by column. And nested loops would do just this. But Basic won't allow us to vary parts of an array's name stem. But, as we've seen, the bits inside the brackets following the stem can vary. We've been doing it all the time. Maybe if we'd have had *Down* inside the brackets . . .

In fact the solution to the problem is that we do just that. Program VI shows the technique in action.

```
10 REM Program VI
20 column=3
30 row=3
40 DIM name$(column,row)
50 FOR row=1 TO 3
60 FOR column=1 TO 3
70 READ name$(row,column)
80 NEXT column
90 NEXT row
100 INPUT "Which row",row
110 INPUT "Which column",column
120 PRINT name$(row,column);
130 PRINT " sits at the desk on row
";row" column ";column"."
140 DATA Pete,Noreen,Colin
150 DATA John,Phil,Lorraine
160 DATA Nahid,Carole,Mike
```

Program VI

● *How it actually works, we'll see next month as our arrays enter a second dimension.*

> **❛ *The micro objects, having taken a dim view of it* ❜**

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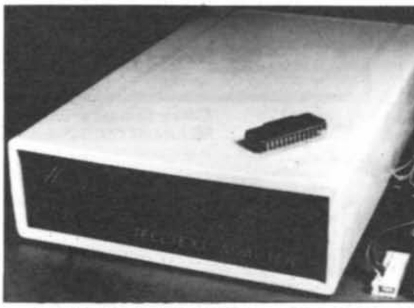

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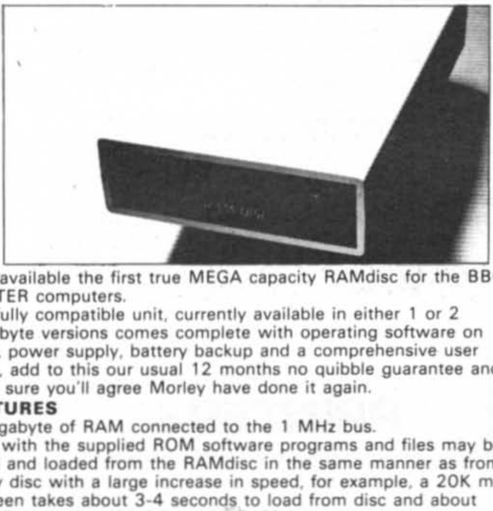

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Additional disc 'A' gives an extra 11 fonts including:-
Greek/Maths, Plain, Hand & (Elite, Condensed, & Super Condensed).

Now included is a facility to issue * commands within a VIEW document.
To download new fonts within VIEW documents, the FONTAID ROM needs to be fitted in the BBC. (All other FONTAID facilities are available on both the FONTAID ROM & DISC). Fonts are always downloaded from Disc.

Fontaid is recommended to Canon & Taxan Kaga owners in preference to Multi-Font NLQ. As downloadable NLQ is a built-in facility of the Printer, full access to all the printers control codes is still allowed. The resolution of the FONTAID NLQ is also slightly higher than that of Multi-Font NLQ.

FONTAID requires 6264 RAM chip in printer.

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An on screen help manual can be created for your application, so that a reminder about more obscure points can be displayed at the users request. Information on your program or datafile contents, can remind you of their purpose.

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CJE micro's

EDUCATION
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Networks rule OK

Peter Slocock argues the case for versatility

IN the October 1986 issue of *Education Micro User* Philip Andrews wrote an article disputing Acorn's claims that Econet is reliable, economic, versatile, powerful and expandable.

For the last two years I have worked on an Amcom E-net network at Worth School, Sussex. Although Amcom's version is not exactly the same as Acorn's, the principle is similar. Our network now includes 10 BBC Model Bs, a B+, a Master 128, a Model B file-server with 20Mb GSL Winchester and two Epson printers.

I have never heard any serious complaints about our E-Net and was surprised to read such an anti-network view. So I decided to put forward an argument in favour of networks.

Let's start with the reliability question. Worth's network has only broken down once in nearly three years, and although the problem was a fairly serious one, the system was back in use in a couple of days. Also four of the 13 computers, including the file-server, have disc drives attached, so not all of the computers were disabled.

If a problem occurs with the Winchester, as it was, it is possible to have a normal disc drive take its place, and have all the computers access this drive as with Acorn's level one and two Econets.

Acorn claims that networking is economic and they could well be right. As Philip pointed out, a network is cheaper to buy and expand than separate machines. Software can work out cheaper too. To run any software with a class of 10 pupils on 10 separate computers it would be necessary to run around the room loading it into each machine. Is it not easier just to type in a command at the file-server on a network?

And what if the software needs to access files while it's running? With separate machines it would be necessary to have bought 10 copies of the program. Surely it is cheaper to buy one network version.

Then there's the question of versatility. Firstly it was claimed that a teacher who wanted to learn more about computing could only do so through taking a computer home. Well, what's stopping a teacher from taking the file-server, complete with its 800k drive, or in our case one of the other computers with disc drive?

Secondly, with a network the teacher in charge has direct control over what software is used and when. With a system of discrete machines, there is little stopping a pupil from slipping a games disc into a drive when the teacher's back is turned, but with a network the possibility simply does not exist.

Philip's costing allowed for a 10Mb hard

→

Domesday invaluable for schools

ACORN'S advanced interactive video system – the first of its kind in the world – is going to prove invaluable to schools as a teaching aid, judging by the results of a survey of educationalists who have already had hands-on experience of the technology.

More than 50 orders were placed for the AIV in its first week of release and it is expected to be in at least 600 secondary schools by the end of the year.

A number of education authorities have been evaluating the system during the latter stages of the Domesday Project, and *The Micro User* canvassed them for their comments.

"This is probably the most exciting piece of technology ever devised.

"The amount of information contained is staggering and would probably take forever to go through", said William Smyth, Education Technology Adviser, North Eastern Ireland Education Board.

"Virtually everything on the curriculum is covered by the discs and our main use would be in the agricultural field, as now we can take the children on a farm study without leaving the classroom.

"It is a tremendous resource for pupils from primary to GCSE level and I would say

→

there is definitely a place for it in every school."

"We are currently using the system to compile a word pack on social studies and have found it to be very impressive and extremely easy to use", said Ian Lewis, Senior Education Adviser, Newport Education Authority.

"It is very user friendly and easy to get on to, it goes down especially well with the kids", said Bruce Wright, Interactive Video Researcher, Exeter University.

"Its main application from our point of view would be in the mathematics field using the bar charts and statistics.

"I think these systems will go into schools but will be either resource or library based", he added.

"We have been using the system with primary and secondary children and for the first time it is they who are asking the questions instead of the teachers", said Les Turnbull, Adviser for Environmental Education, Gateshead Education Authority.

"It has proved very easy and

From Page 55

disc, the equivalent of a hundred 40 track ones. This is not very much, but have you ever tried finding a particular file on one of 100 discs?

Nowadays computers are taking the place of filing cabinets, so it is pointless to have to bring them back to file the discs. Hard discs are also much more reliable than floppies. I am sure many BBC Micro owners dream about the day when they can afford a hard disc.

If wise use is made of subdrives and priorities on a network it's easy to keep it uncluttered. If separate subdrives are kept for use only with specific subjects, word processing for example, there is no difference from using floppies, except that there is no danger to the data from sticky young fingers, or loss of the discs themselves.

Another question raised in Philip's article was whether networks are expandable. Of course they are, and cheaper than buying more discrete machines, especially if spare sockets are included when the network is installed ready for future expansion.

The lack of network compatible software is the problem I have heard mentioned most. However I believe that there is no problem here either. In my experience most software works perfectly with little or no alteration, and on a system like that at Worth School any that doesn't can be run quite happily on one of the disc machines with the network lead unplugged.

Many network incompatibilities can be solved by unplugging the network lead just after the program has loaded. However one's position regarding copyright is not clear, although I am sure that in most cases a software company would not mind a copy of its software being put on a network as long as the original was bought for that purpose and kept in the hands of the person in charge of the network.

This brings us to the person responsible for the network. It is true that there has to be one, but someone is needed to keep everything under control with any computer system, including one built up of discrete machines.

Someone in charge of a network need be no more computer literate than a person running 10 individual machines, and need spend no more time working on the computers. There are obviously problems in this area, but they are the same in both situations.

It must be remembered that Acorn's is not the only network for BBC Micros and before choosing one you should assess the features offered. However, any network can only widen the scope of computing within education and a network is an exeellent asset for any school.

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A comparison of three 65C12 assemblers

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Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
String functions	Yes	Yes	No
True macro libraries	Yes	No	No
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Use any editor?	Yes	No	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C12 only	65C12 only
Switch off 65C12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Symbolic	No	Simple
Label restrictions	No	Yes	Yes

ADE+

Versions and prices

Recommended for Master Compact...
ADE+ MMU and 65C00 series assembler on disc (3.5" ADFS). 32K sideways RAM required.
£42.00 + vat

Recommended for BBC B, B+ ...
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£46.00 + vat

Recommended for Master 128, turbo..
ADE+ MNU and 65C00 series assembler on EPROM cartridge with 5.25" DFS utility disc
£49.00 +vat

Upgrade
ADE to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ADE ROM chip)
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ASM to ADE+ (upgrade to either disc, EPROM or cartridge, you must send in ASM ROM chip)
£35.00 + vat

Please add £1.25 P&P per unit.

ADE+

The Ultimate Assembly Language Development Tool
ADE+ is a 65C00 series assembler system supporting all the mnemonics of the 65C12 used in the latest BBC microcomputers plus the additional 'Rockwell' instructions. ADE+ is fast, faster in fact than the in-built BASIC assembler and all rival products that we have tested. The assembler produces absolute code that can be *RUN or linker modules that can be merged with the output from other programs using the ADE+ linker. ADE+ supports a powerful linker which drastically cuts assembly time; a feature normally only found on minis and mainframes. The linker will even link the output from compilers with your assembly language programs. Full library support for both the linker and the assembler is provided - fast searching for unknown instructions in a random access macro library. ADE+ is a modular system with many modules to add later; i.e. a mouse based editor & a Z80 cross assembler! A print spooling system uses sideways RAM as a print buffer to eliminate waiting time: your listing runs off as a background job! Use the print spooler from BASIC or your own programs. ADE+ uses ALL available memory. With a second processor attached the IO processor spare memory is used as a buffer to reduce the amount of disc access. All available memory is handled by ADE+'s intelligent memory management module. Use your own favourite editor or the one provided. Assemble from disc or memory. Full utilities including librarians, converter for BBC BASIC etc. ADE+ must be *the* bargain of 1986/7!

Learning CAN be fun

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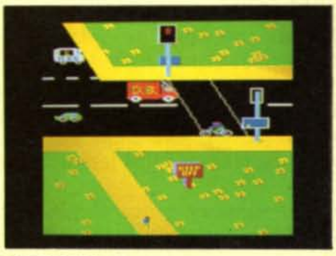
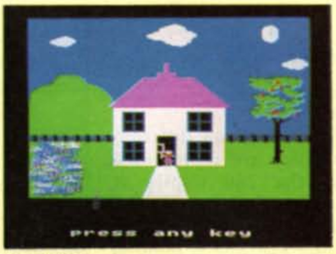
BBC Micro & Electron
BBC Micro & Electron
programs for 5-8 year olds
BBC Micro & Electron

Ages 2-5

- Alphabet
- Colours
- Counting
- House
- Magic Garden
- Matchmaker
- Numbers
- Pelican
- Seaside
- Snap



PELICAN
Teach your children to cross the road safely at a Pelican crossing

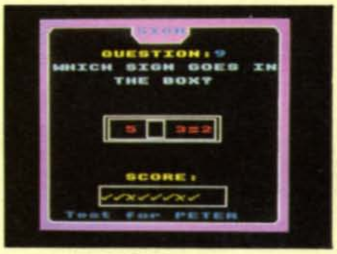


```
press any key
```

HOUSE
Select the colours to draw a house – hours of creative entertainment

Ages 5-8

- Balance
- Castle
- Derrick
- Fred's Words
- Hilo
- Maths Test
- Mouser
- Number Signs
- Seawall
- Super Spell

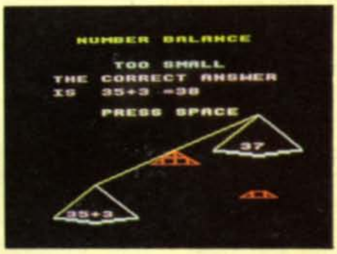


```
QUESTION: 9
WHICH SIGN GOES IN
THE BOX?

SCORE:

Test for PETER
```

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten

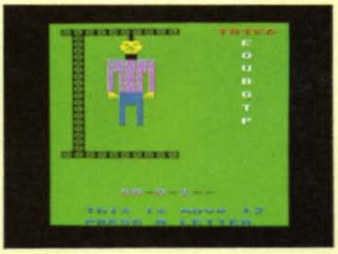


```
NUMBER BALANCE
  TOO SMALL
THE CORRECT ANSWER
IS  35+3 =38
  PRESS SPACE
```

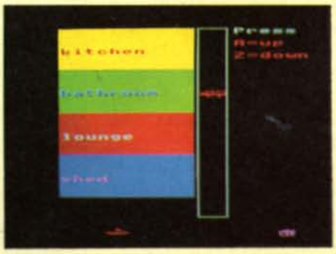
BALANCE
Learn maths the fun way. Type in the answer to balance the scales

Ages 8-12

- Anagram
- Codebreaker
- Dog Duck Corn
- Guessing
- Hangman
- Maths Hike
- Nim
- Odd Man Out
- Pelmanism
- Towers of Hanoi



HANGMAN
Improve your child's spelling with this fun version of the popular game



```
kitchen
bathroom
lounge
shed
```

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 159

simple to operate – the information provided is extremely detailed and we look forward to using it in the future".

Consisting of an adapted BBC Master with the AIV filing system, LaserVision disc player, monitor, trackerball and two Domesday data discs, the retail price of the system is £3,990.

However, educational establishments are eligible for discounts from manufacturers Acorn and Philips and also for a grant from the Department of Trade and Industry.

Acorn and Philips are jointly offering a voucher worth £800 to schools interested in purchasing the system. The DTI grant is worth £194.52.

Therefore schools can obtain a complete system for £2,995.48 or the upgrade system for £2,703.05

Spanish lessons

NO fewer than 40 different nationalities are represented among the 260 pupils at Runnymede College, a British secondary school in Madrid.

All the teaching is done in English to bring order into this polyglot situation – further assistance coming from a BBC Micro and Mini Office II software.

Chemistry teacher Steve Sheriff introduced the micro to Runnymede soon after joining the staff two years ago.

In the classroom the machine runs a wide range of chemistry programs such as simulated experiments and analysis.

Sheriff also keeps a Mini Office II database file on each chemistry class age group, containing pupils' progress reports and records of chemicals ordered and supplied.

"The database and spreadsheet facilities of Mini Office II are a great help", he told *The Micro User*.

"I also use Mini Office II files to keep a chemistry data book – as complete a reference work as I can devise for all the things we need to look up from time to time.

"Using the spreadsheet in the classroom has a useful spin-off in that pupils are picking up computing skills at the

New approach to WP

FOLIO – just another word processing package, I thought – but how one can be deceived by past experience. This program for the BBC Micro, B+ and Master, published by Tedimen Software, has a refreshing new approach.

A quick glance through the easy to read, concise and sturdy manual that accompanies the package reveals comprehensible, virtually idiot proof text. This is backed up by a liberal inclusion of screen dumps – all of which quickly instills confidence.

Simple on-screen menus, as shown in Figure I, give you continued enthusiasm to proceed and you progress virtually without hesitation into the write mode.

Correctly spaced and shaped lower case text appears on the screen – large, easy to read letters that are just what the infant and lower junior school classes have been asking for.

Gone are the criticisms that "it takes ages to fill the screen" or "the child will never read that" – the text area fills rapidly and legibly.

As you write, a memory gauge shows the amount of space available for your work. The number of the page is also shown for reference, and the layout as it would appear on paper is displayed alongside as you can see in Figure II.

When you finish writing, simply press Escape to return to the menu. Here you are presented with various control facilities which allow you to Print, Load, Save, Empty or Finish.

The program offers a choice of printing formats – Story Book, News or Display. Each offers a variety of fonts, letter sizes and words to the column.

The manual perhaps fails to explain the printing/display options clearly, but they are great fun to explore, and the results are gratifying. The cursive script is a particular favourite when used in the large print mode.

Product: Folio
Price: £17.95 (Bulk discounts and licences available)
Supplier: Tedimem Software, P.O. Box 23, Southampton, SO9 7BD.
Tel: 0703 473774

For high quality prints for photocopying, the program offers a double or even triple print intensity – handy when the ribbon becomes worn as well.

Folio can be used with Concept Keyboards and it also offers a keyboard overlay facility. You can make your own by using the program, or by using the useful option which allows you to import disc overlays programmed from Prompt2 or Prompt3 files.

The latter is invaluable to those who have already built up Prompt3 files, as combined with Folio's print options the results are suberb – especially for the educationally less able child. The examples shown were produced by a virtual non-reading eight-year-old using Folio with Prompt3 imported.

The program is particulary suitable for infant children. It presents a forgiving nature through its simple menu system, hidden safety nets and especially the undo command.

Reviewing work before printing is simplified with the look up and look down facility using the f1 and f2 keys.

Editing and correcting is simple and with the large on-screen print the child can see what he is doing. The cursor is replaced by a flashing pen which is confusing initially

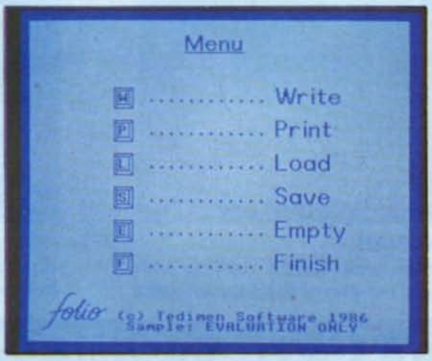
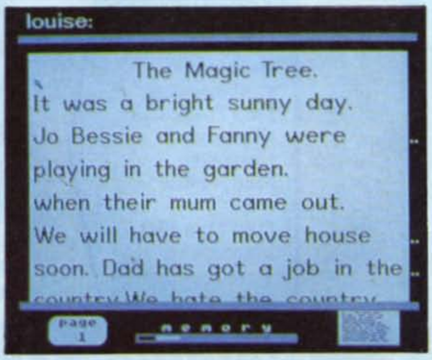


Figure I: Folio's main menu, showing the options available



The Magic Tree.
It was a bright sunny day.
Jo Bessie and Fanny were
playing in the garden.
when their mum came out.
We will have to move house
soon. Dad has got a job in the
country.We hate the country

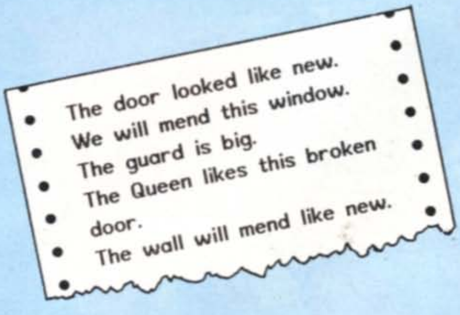
Figure II: Large, clear characters, and graphical representation of memory and format

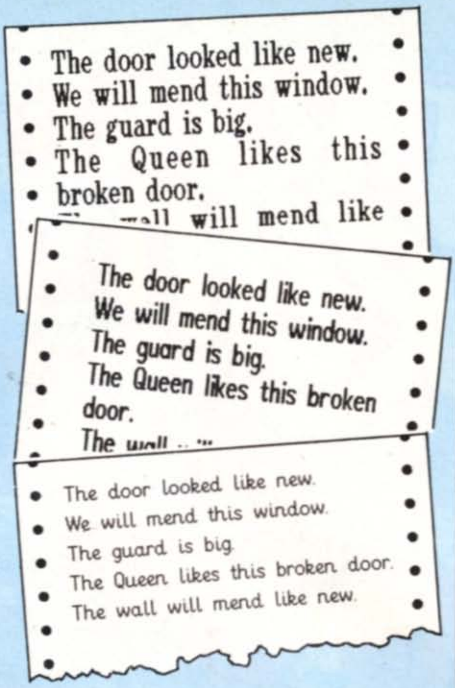
but preferable at this stage of development.

If the aim was to create a word processing program that is both simple to use and versatile in application then Tendimen Software deserves full marks.

Delve a little deeper as confidence grows and you have a little gem of a program for pupil, teacher and home user. It is fun to explore, redeeming in nature and a valuable aid to learning.

Andrew Heaton


The door looked like new.
We will mend this window.
The guard is big.
The Queen likes this broken
door.
The wall will mend like new.


The door looked like new.
We will mend this window.
The guard is big.
The Queen likes this
broken door.
will mend like

The door looked like new.
We will mend this window.
The guard is big.
The Queen likes this broken
door.
The wall ...

The door looked like new.
We will mend this window.
The guard is big.
The Queen likes this broken door.
The wall will mend like new.

Sample printouts from Folio

SOLVING PROBLEMS

READERS will be aware that the magazine is seeking to expand coverage of the BBC Micro in the educational field. Thus, I was glad to receive a disc with an educational flavour.

I'm not a teacher, but I am a governor of our local primary school – so I sent it there for a term's evaluation by pupils in the 9-10 year age range. Some of their comments will be found at the end of this review.

Mad Painter is an adventure in four parts: The Lost Sweep, Pathway to Danger, The Final Picture and The Colour Trap. Solving one produces the password to the next.

The documentation gives clear instructions, and suggestions for teachers on follow-up topic work. It also provides the teacher with a map of each section, the required passwords and the vocabulary understood by different parts of the adventure.

An excellent feature is the way the function keys have been programmed to give the six directions permitted together with Inventory, Hint, Examine and Get at a single keystroke.

This feature must help reduce pupil frustration by avoiding typing errors. For that reason, I don't suppose it matters too much if the Break key is pressed by mistake – though I would recommend some physical guard is placed over it.

Sound is used at various appropriate points to reinforce approval or warning and some use is made of pictures, too – simple Mode 7 graphics that are very effective.

The primary aim of these linked adventures is to teach the pupils something about problem-solving. They are also introduced to the adventure game concept, although with TV programmes like Dungeons and Dragons available the concept is becoming more familiar.

Program: Mad Painter
Price: £6 (80 track disc)
Supplier: R. Soft, 22 Marriotts Close, Felmersham, Beds. MK43 7HD

The fourth part, The Colour Trap, is an elaborate maze requiring careful mapping and some knowledge of the colours of the spectrum. I would recommend the adventures are tackled by pairs or small groups.

Although not a professional, I have a real interest in Primary Education and I'd suggest Mad Painter is very good value for money – and a useful educational tool for the upper end of the junior age-range. However, let the pupils speak for themselves.

"I like The Mad Painter because it is an adventurous and strange game. The way it gives a choice is very good".

"I think that The Mad Painter is good because it makes you think".

"I found it hard to get out of the wood. It only got boring then".

The above very frank comments were written by 9-year-olds. As you can see, two areas of difficulty were encountered – mazes were found boring, and there were occasional problems in understanding the language used in descriptions.

A short introductory session given by the teacher with each group using the game would go some way to overcoming the language problems, and a brief mapping lesson would help with the mazes.

Recommended. **Bob Redrup**

→

same time as learning about chemistry.

"I've also started a word processing class for the staff to introduce them to computing.

"Here I mainly use Wordwise, but also Mini Office II because of its extremely helpful 80 column typing mode".

Cable graphics

BECAUSE of the BBC Micro, material prepared by local schoolchildren and college students is going to be a feature of Ealing's new cable television system CableTel.

The company has chosen a titling and graphics system based on the BBC Micro to open the door for community input that will range from professional reports by the local weekly newspaper staff to children's contributions.

The system is based on a video caption generator program called the Lynx II. Developed by Interactive Research it runs on the BBC Micro and Master 128.

Initially CableTel will use it to display the programme guide for its 28-channel service and its community notice board channel offering news, adverts and information about local events and organisations.

Students at Ealing College of Higher Education are among the first contributors of designer graphics for the channel.

The Ealing Gazette series of newspapers will be supplying regular reports. This and the input from local colleges are supplied on floppy discs prepared on their own BBC Micros.

CableTel commercial controller John Proctor told *The Micro User:* "We also intend that the system should eventually be accessible directly by modem".

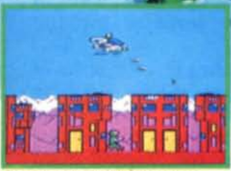
Jumping the gun

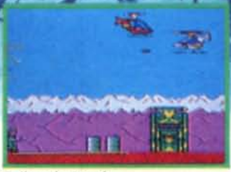
A WARNING has gone out to people planning to enrol for the next round of Open University courses involving computers, which starts next year.

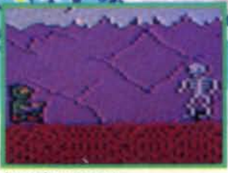
It is: "Don't jump the gun and buy a micro on the basis of

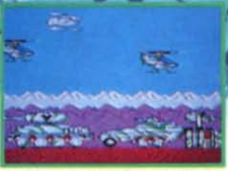
→

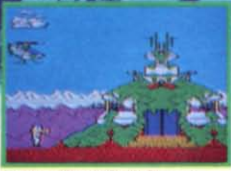
STRYKERS RUN
The first release to include a specially enhanced version for the BBC Master making use of its 128K RAM. An extra 40K of detailed graphics are provided together with additional game features and atmospheric music.


Commander Stryker under fire in the city


Battling in the air


An action close-up


Enemy equipment (Enhanced BBC Master version)


A camouflaged Battle fortress (Enhanced BBC Master version)

STRYKER'S RUN for the BBC Micro B, B+, Master and Master Compact.

Compatible with the BBC B, B+, Master and Master Compact computers.

Stryker's Run features probably the best graphics ever seen on the BBC Micro; the action is intense and the animation is superlative.

The battlefield graphics include cities, edifices, wrecked buildings, trees gravestones, bridges, despatch-posts, military bases, helicopters and jet ships, with hills and mountains in the background. The Master-enhanced version also includes statues, watch-towers, a neglected cafe, a deserted cinema, aircraft hangars, aeroplanes, trucks and tanks.

For many years, a war has ensued between the Allied Nations and the Volgans. The battle was reaching a stalemate position, but recently the Allies through good intelligence work and some luck have managed to obtain the plans of the Volgan's next offensive. If the Allied Forces can capitalise on these plans they can end the impasse and the war. You play the role of Commander John Stryker commissioned to take this top-secret information to the Allies' HQ.

Your character in the game can jump, run, duck, fire his laser pistol and throw grenades. He can also board aircraft and fly them, making use of their more powerful weaponry.

Your opponents, the Volgans, have a variety of weapons at their disposal comprising rifles, pistols, grenades, machine-guns, mortars, mines, helicopter gunships, rocket launchers and SAM missiles.

Game Author: Chris Roberts.

PRICE: £9.95 (cassette), £11.95 (BBC Micro 5¼" disc), £14.95 (Master Compact 3½" disc).

PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES PRIZES

If you complete the game, you can enter our competition. The prizes include a radio controlled 4-wheel-drive off-road racer (worth £200) complete with control system, trophies and £20 in consolation prizes.

Closing date: 31st March, 1987.

SUPERIOR SOFTWARE Limited

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Making the correct ~~decision~~, ~~selection~~ CHOICE

Mike Bibby introduces a program to develop a child's decision-making skills

IF you've ever been involved with preparing a guest list for a children's party you'll have discovered how difficult decision-making is for youngsters. Should Sarah or Julie have that last invitation?

And decision-making skills play no less a part in the classroom: The fostering of a child's ability to set priorities and evaluate data according to those priorities is educationally vital.

However, while straightforward choices often present no problem, when there's a range of options difficulties can arise.

That's where the program Choice comes in. It pairs off the options into a tournament, and you decide the winners of a series of "bouts". The overall winner is the one most often chosen.

For instance, if you wanted to decide whether to paint your house red, blue or green you would be asked to choose between:

```
red v blue
red v green
blue v green
```

If you chose red for the first two choices and blue for the last, you'll be presented with a priority-ranked listing:

```
red____________________2
blue___________________1
green__________________0
```

Admittedly, processing decisions this way is somewhat artificial, but it does focus your attention on the factors involved in the choice.

> ***The fostering of a child's ability to set priorities and evaluate data is . . . educationally vital.***

The response to a priorities list generated this way can often be "Yes, but that isn't the whole story", which is valuable in itself and can lead to a re-evaluation of the decision-making process.

When you run Choice, you'll be asked for your first option: I use INPUT LINE here, so you can enter several words if you wish. After Return, you'll be offered another option, and so on until you enter **end**.

I opted for this method rather than asking straight off "How many options?", because children often want to add extra ones as the list sparks off new ideas.

The maximum number, set by *limit%*, is 20, but bear in mind that this will give you 190 pairs of choices.The sum is:

choices*(choices–1)/2

Probably eight options – giving 28 pairs – is the practical upper limit.

Choice will present the pairs, the upper labelled **P** and the lower **L**. You simply enter P or L (lower or upper case) to choose. I picked the letters P and L as they're above each other on the keyboard, though you can easily alter this (PROCchoose).

And that's really all there is to it. Once you've made all your choices, it sorts them into order then prints them out, offering you hard copy if you want.

As it stands the program is reasonably well structured, and the long variable names should make what's going on fairly clear.

There are some improvements you might consider adding though. For instance, you might like to input a standard set of options from tape or disc, rather than have each child generate his or her own. Then again, you might want to save the results, or print them out in a graph.

And psychologists would want to change things so that the same option didn't always appear at, say, the top over a series of choices, so as to randomise the effects of people preferring to press the upper key!

Whatever changes you make, you'll find Choice valuable in the classroom, both for making decisions and for stimulating discussion on the way they're made.

---

misleading news items – you could find yourself stuck with the wrong equipment".

A story going the rounds of the computer media has it that the Amstrad PC1512 will be endorsed by the Open University as the recommended machine for its computer-related courses starting in 1988.

But Open University spokeswoman Annette Mathias told *The Micro User:* "This is totally false.

"No decision has yet been made as to which micro we will recommend, and it could be May before the announcement is made.

"Several months ago we invited all leading micro manufacturers to supply us with details of their products and most of them responded.

"At the moment no one firm is ahead of the others in the competition. The matter is still very much under discussion.

"Any potential student who rushed out and bought an Amstrad now on the basis of rumours could end up making a mistake".

Acorn has confirmed it is one of the companies in the running for the Open University recommendation.

Its Master 128 meets the Open University maximum price specification of £500 and the firm is the acknowledged leader in educational computing.

There is also a possibility that Acorn will bring out a PC clone of its own, or that it will further enhance the Master's capabilities in order to make it more attractive to the Open University.

Whoever gets the nod will make a lot of money. About 15,000 people are expected to enrol in the Open University computer-related courses during the next three years.

Problem solving

A NEW multi-media teaching package involving radio, television, computer software and publications has been produced by BBC Schools Radio and Television.

It is intended to support current trends in the teaching of technology and design in secondary schools and introduces pupils to the process of problem-solving in a variety of situations.

Beginning this month, the series demonstrates how industry tackles problems, and provides students with the information they need for their own simulated problem solving.

Three television programmes in March will provide an introduction to the topics of packaging, sorting and moving. Each explores an industrial case study and poses problems for classroom investigation.

Radio resources comprise 12 10-minute programmes for small group or individual use and four 20-minute programmes for class use. These will be transmitted in five 40-minute night-time broadcasts during February.

Each 10-minute programme is an introduction to an idea or technique which may be used by technologists in problem-solving.

Some of these programmes are computer synchronised audio, linked with software designed to be used by pupils alongside the tape of the radio broadcast.

The 20-minute programmes are intended to complement ideas introduced by the TV broadcasts, providing extra material and contexts for classroom work. Emphasis is on the design process and its relation to real-life situations.

Other self-standing software on the themes of packaging, moving and sorting is under development. This is intended to give pupils a chance to experience something that is either difficult or impossible to emulate in any other way.

Software, and a radiovision slide pack containing material teachers can use to construct their own presentations, is available from BBC Publications.

Cheaper publishing

WITH the extensive graphics and text packages now available, producers of educational programs can put together a sequence of images which can explain and teach in a very explicit way.

Furthermore, they can do this without having to pay for the production of – and subse-

From Page 61

```
  10 REM *****************
  20 REM ***   Choice  ***
  30 REM *** (c) Micro ***
  40 REM *** User 1987 ***
  50 REM *****************
  60 *TV 0,1
  70 *FX202,48
  80 MODE 6
  90 VDU 23;8202;0;0;0;
  100 limit%=20
  110 DIM option$(limit%),count%(limi
t%)
  120 store%=0:store$="":counter%=0
  130 string$=STRING$(32,"_")
  140 number%=FNenter_options
  150 IF number%<3 THEN END
  160 PROCdecide(number%)
  170 PROCsort(number%)
  180 PROCprint_out
  190 END
  200 REM ================
  210 DEF FNenter_options
  220 REM ================
  230 test=FALSE
  240 REPEAT
  250 counter%=counter%+1
  260 REPEAT
  270 PRINT "Option ";counter%;
  280 INPUT LINE option$
  290 UNTIL option$<>""
  300 IF (option$<>"END" AND option$<
>"end") THEN option$(counter%)=option
$ ELSE test=TRUE:counter%=counter%-1
  310 UNTIL test OR counter%=limit%
  320 =counter%
  330 REM ===================
  340 DEFPROCdecide(number%)
  350 REM ===================
  360 LOCAL outer_loop%,inner_loop%
  370 FOR outer_loop%=1 TO number%-1
  380 FOR inner_loop%=outer_loop%+1 T
O number%
  390 IF outer_loop%<>inner_loop% THE
N PROCchoose(outer_loop%,inner_loop%)
  400 NEXT inner_loop%
  410 NEXT outer_loop%
  420 ENDPROC
  430 REM ==================
  440 DEF PROCchoose(P%,L%)
  450 REM ==================
  460 LOCAL choice$
  470 CLS
  480 PRINT TAB(0,5)"Do you prefer P
or L?"
  490 PRINT TAB(5,12)"P> " option$(P%
)
  500 PRINT TAB(5,17)"L> " option$(L%
)
  510 REPEAT: choice$=GET$: UNTIL INS
TR("PpLl",choice$)
  520 IF INSTR("Pp",choice$) THEN cou
nt%(outer_loop%)=count%(outer_loop%)+
1 ELSE count%(inner_loop%)=count%(inn
er_loop%)+1
  530 ENDPROC
  540 REM ==================
  550 DEF PROCsort(number%)
  560 REM ==================
  570 LOCAL range%,sort%
  580 FOR range%= number% TO 2 STEP -
1
  590 FOR sort%= 2 TO range%
  600 IF count%(sort%)>count%(sort%-1
) THEN PROCswap(sort%)
  610 NEXT sort%
  620 NEXT range%
  630 ENDPROC
  640 REM ================
  650 DEF PROCswap(sort%)
  660 REM ================
  670 LOCAL store%,store$
  680 store%=count%(sort%):count%(sor
t%)=count%(sort%-1):count%(sort%-1)=s
tore%
  690 store$=option$(sort%):option$(s
ort%)=option$(sort%-1):option$(sort%-
1)=store$
  700 ENDPROC
  710 REM ==============
  720 DEF PROCprint_out
  730 REM ==============
  740 LOCAL option$
  750 CLS
  760 REM *FX6,0
  770 PRINT TAB(0,12) "Do you want ha
rdcopy of your choice?"
  780 REPEAT:choice$=GET$: UNTIL INST
R("YyNn",choice$)
  790 CLS
  800 IF INSTR("Yy",choice$) THEN VDU
 2
  810 FOR loop%=1 TO number%
  820 option$=LEFT$(option$(loop%)+st
ring$,32)
  830 PRINT TAB(0,loop%) option$+" "
TAB(36,loop%);count%(loop%)
  840 NEXT loop%
  850 VDU 3
  860 ENDPROC
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

The most adventurous and original way to test your French ever devised.

FRENCH on the RUN!

The adventure game with a big difference.

£9.95 cassette
£11.95 5¼" disc

You're on your own in Occupied France — facing the toughest test that a British pilot has ever had to experience!

The year is 1943. As an RAF officer stranded in Occupied France you have one aim – to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks – from buying food to taking buses – place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence – you need the password from the last before attempting the next. The standard of French required is about O level, though on the last route it rises to just below A level.

And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

For teachers: *French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.*

DATABASE SOFTWARE

TO ORDER TURN TO THE FORM ON PAGE 159

quent tinkering with – expensive artwork.

The problem has been how to "publish" the results of such endeavours cheaply – given that there is a very large market for programmes released on video cassette, providing transfer of computer disc to video can be accomplished without loss of quality.

One solution comes from Flintdown Channel 5 Television, a specialist video laboratory which can take most computer-generated discs and copy them in full colour on to Beta, VHS or Video 8 cassette formats and produce duplicated copies if required.

The system for doing this includes a digital frame store standard converter which generates full-frame, flicker-free hi-definition pictures, in either British, French or American replay standards.

From any computer disc, the ultimate definition is limited only by the choice of cassette format – U-Matic giving the highest non-broadcast option.

A special input board has been designed to take advantage of the micro's RGB and sync. outputs and immediately convert this to an 8 bit digital code by high-speed A to D converters.

This is then stored in two frame stores which hold 625 lines with 720 pixels per line and are read under the control of a high specification sync. pulse generator either at the 525 line or 625 TV standards.

De-multiplexing and coding into PAL, SECAM or NTSC outputs is accomplished by further processing in high specification colour encoding circuitry.

Each frame of image from the original disc can be held as long as is required, and a commentary added to the video cassette soundtrack if needed.

The system makes computer-generated teaching and learning programs available to schools and colleges which have access to a video tape recorder as well as a micro.

The video tape can be further processed by Flintdown to produce laservision discs for interactive video teaching on, say, a multiple choice question and answer basis. More than 43,000 individual frames can be stored and accessed by this means.

MAP

Learn here with NORMAN PARR how to find your way round grid references . . .

THIS is a straightforward implementation of a basic geographical exercise Its aim is simply to test the understanding of four and six figure grid references.

There are 10 questions, five of each of the two types, and no symbols are included, which might add to the complexity.

At the end of the test each individual is given a score with an option to obtain a hard copy. When the group as a whole has finished there is an option menu allowing the general scores to be listed. Any individual's performance may be viewed with his or her attempts and, if necessary, the correct answers displayed.

At the start of the program the teacher enters the number attempting the test. After this, individuals should type in their names as they begin their set of questions.

The test is based on a 6 by 4 matrix and each of the grid squares is approximately the same size as that on a 1:50,000 Ordnance Survey map. As each person attempts the four figure references the eastings and northings are drawn at random, but the actual squares chosen are the same each time.

In the case of the six figure references the grid is numbered at random but the placing of the asterisk to mark the position is allowed to vary.

This variability is not totally random as I feel that certain third and sixth digits are more difficult than others. Reference to PROCtest2, lines 1580 to 1620, shows this limited variation.

The first reference is always where two numbered grid lines meet so forcing

VARIABLES

A$(K,I)	Carries the references chosen at random.
Answer$(K,I)	Answer typed in by the student.
Score(K)	Score for each individual.
NAME$(K)	Name for each individual taking the test. East and north are the randomly chosen starting points for the eastings and northings.

PROCEDURES

test1, test2	Control the running of the four and six figure tests respectively.
grid	Prints out the 6 by 4 matrix.
easting **northing**	Select the eastings and northings and print them out on the grid.
checkx **checky**	Allow acceptable variations in the eastings and northings.
checkinput (M)	Used to verify that numbers only are being used.
names, all, **every, end**	All involved in the final menu used to view the results.

TEST

an understanding of the use of zero as the third and sixth digit. In a similar fashion the second reference tests 5 and 5 (line 1590) and so on.

Although not strictly correct in a test situation, the program does not allow more than four or six digits – controlled by lines 1020 and 1700 – and only numbers must be typed in. The program copes with this by accepting the string containing the reference and then running it through PROCcheckinput(M).

This procedure searches through each element of the string and uses the Ascii codes to judge whether it is a letter or a number. The presence of any letter in the string forces an ENDPROC and then a repeat of the string entry.

When assessing the six figure references some allowance is made for possible variations in the answers. Obviously many references could vary by at least one tenth from the most acceptable answer. In this case the reference lying exactly on line intersections can be only zero, but others may vary.

Lines 1880 to 1960 show the variations allowed in the eastings and lines 2010 to 2080 are the acceptable ones for the northings.

Of course there can be variations in both the eastings and northings, and from a programming point of view this adds an extra complexity. The variable *z* is used in PROCcheckx to look for an acceptable easting.

If this is found it is carried forward to PROCchecky to search out an acceptable northing within the limits imposed. ■

```
    5 REM(c) The Micro User
   10 IF PAGE<>&E00 THEN 2650
   20 *FX11,0
   30 *FX220,1
   40 *KEY10 CH."MAPTEST"|M
   50 VDU23;11,0;0;0;0
   60 CLS
   70 DIM A$(5,11),Answer$(5,11),Scor
e(5),NAME$(5),B$(5)
   80 FORI=1TO5:READB$(I):NEXT
   90 DATA A,B,C,D,E
  100 PRINTTAB(6,5)CHR$141CHR$132"GRI
D REFERENCE TEST"
  110 PRINTTAB(6,6)CHR$141CHR$135"GRI
D REFERENCE TEST"
  120 PRINTTAB(14,10)CHR$141CHR$129"b
y"
  130 PRINTTAB(14,11)CHR$141CHR$129"b
y"
  140 PRINTTAB(11,15)CHR$141CHR$130"N
orman Parr"
  150 PRINTTAB(11,16)CHR$141CHR$131"N
orman Parr"
  160 PRINT'''
  170 PROCsp
  180 CLS
  190 Prin=0
  200 PRINTTAB(2,5)"HOW MANY ARE TO T
AKE THE TEST?":PRINTTAB(2,7)"THE MAXI
MUM NUMBER IS 5":PRINTTAB(2,9)"TYPE I
N THE NUMBER AND PRESS RETURN"
  210 PRINT'':INPUT Number
  220 IF Number<0 OR Number>5 PRINT"T
YPE NUMBER AGAIN":GOTO210
  230 PRINT'"Is there a PRINTER attac
hed?"
  240 PRINT'"Answer Y/N"
  250 A=GET
  260 IF A<>89 AND A<>78 GOTO250
  270 IF A=89 Prin=1
  280 CLS
  290 FORK=1TONumber
  300 CLS:PRINTTAB(2,5)CHR$141CHR$130
"4 FIGURE GRID REFERENCES"
  310 PRINTTAB(2,6)CHR$141CHR$129"4 F
IGURE GRID REFERENCES"
  320 PRINTTAB(5,10)CHR$131"TYPE IN Y
OUR NAME":PRINTTAB(5,12)"PRESS RETURN
 AFTERWARDS"
  330 PRINTTAB(5,17)"_______________
"
```

European system

ACORN has denied that the operating system for the proposed European educational micro has been decided upon.

A story carried in last month's education section of *The Micro User* said that Acorn, Olivetti and French manufacturer Thomson had agreed to use the OS-9/68000 operating system.

But Acorn spokesman Michael Page said: "This is not the case at all. No decision has been taken yet.

"This story appears to have emanated from a firm which has a commercial interest in OS-9 – and it has jumped the gun.

"Thomson has probably taken out an evaluating licence on OS-9, but that is all.

"There is no agreement as yet between ourselves and the other partners in the project regarding the operating system".

Teaching packs

THE Shell Centre, University of Nottingham, has released a number of ITMA Teaching with a Micro packs for primary and secondary pupils.

They are on BBC Micro 40 or 80 track 5.25 in discs, with Econet compatible versions available for standard level 2 systems.

The five titles are Maths 1, 2, 3 and 4, and Music 1.

Maths 1, for children aged 11 to 14, has five program teaching units.

Decode is a group activity program about probability in which pupils' discoveries concerning letter frequencies help them break codes.

Plod is a mathematical investigation with graphics in which the pupil has to position on a map the minimum number of policemen required to observe an entire town.

Salesman encourages pupils to think about their methods of problem-solving by comparing their approach to that of the computer in scenarios based on routes taken by a travelling salesman.

Sincos uses the micro as a

visual aid to introduce sines and cosines. A rotating arm can be set at any angle, its height giving the sine of the angle and its width the cosine.

Vector is a treasure-hunting game designed to sharpen pupils' understanding of the difference between vectors and coordinates. It also provides a natural way to use directed numbers and could be used to introduce this topic.

Maths 2, also for 11 to 14 year olds, has four program teaching units.

Bottles makes pupils think about the relationship between graphs and events in the real world. Animated graphics show a bottle filling with water while a graph plots the height of the liquid against time.

Sunflower is a problem-solving exercise which encourages systematic investigation, introduces ideas about scientific method and practices place value in the use of decimals.

Traffic develops pupils' graph interpretation skills by using animated graphics to aid their understanding of distance-time graphs, and by challenging them to match graphs with realistic situations such as the movement of vehicles.

Zoom uses animated graphics to aid exploration and development of ideas about decimals, particularly place values.

Maths 3, for slightly older pupils, has four program teaching units.

Times uses reaction times to explore some simple ideas about statistics, and supports a classroom activity which could be used at a wide range of ability levels.

Engram investigates patterns in natural numbers through colouring related numbered cells on different types of grids.

Dogs demonstrates a number of properties of equiangular, or logarithmic, spirals.

Splot is a simple investigative program for plotting spirals, producing dramatic and unexpected graphical effects.

Maths 4 has been developed jointly by Gordon Haigh and ITMA for the 11 to 14 age range and includes five mathematical games.

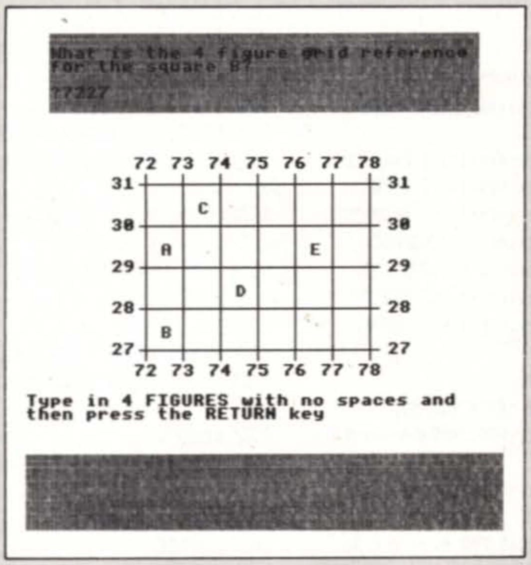
Takes and Adders is a version of the famous board game

From Page 65

```
  340 VDU11,11
  350 INPUT TAB(5)NAME$(K)
  360 MODE1
  370 VDU23;11,0;0;0;0
  380 VDU19,0,4,0,0,0
  390 Score=0
  400 PROCtest1
  410 PROCsp
  420 VDU26,20:CLS
  430 PROCtest2
  440 Score(K)=Score
  450 MODE7
  460 P=0
  470 VDU23;11,0;0;0;0
  480 PRINTTAB(1,5)CHR$129NAME$(K)
  490 PRINTTAB(1,7)CHR$131"Your mark
is ";Score(K)
  500 PRINTTAB(1,9)"Reference     You
r answer"
  510 T=12
  520 FORI=1TO10:PRINTTAB(1,T)A$(K,I)
TAB(16)Answer$(K,I):T=T+1:NEXT
  530 IF P=1 VDU3
  540 PRINT''"PRESS P FOR A PRINTOUT"
  550 PRINT'"PRESS SPACE BAR TO CONTI
NUE"
  560 X$=GET$
  570 IF Prin=1 AND X$="P"CLS:P=1:VDU
2:GOTO480
  580 VDU3
  590 CLS
  600 NEXTK
  610 CLS
  620 PRINTTAB(5,4)CHR$129"TEST RESUL
TS"
  630 PRINTTAB(5,6)CHR$131"CHOOSE FRO
M THESE OPTIONS"
  640 PRINTTAB(5,8)"1. VIEW ALL MARKS
"
  650 PRINTTAB(5,10)"2. CHOOSE ONE SE
T OF RESULTS"
  660 PRINTTAB(5,12)"3. PRINT OUT ALL
 THE RESULTS"
  670 PRINTTAB(5,14)"4. END THE PROGR
AM"
  680 PRINTTAB(2,16)CHR$136CHR$130"PR
ESS THE NUMBER YOU WANT"
  690 H=GET
  700 IF H=49 PROCnames
  710 IF H=50 PROCall
  720 IF H=51 PROCevery
  730 IF H=52 PROCend
  740 GOTO610
  750 IFH<49ORH>52GOTO690
  760 END
  770 DEFPROCtest1
  780 COLOUR3
  790 GCOL0,3
  800 PROCgrid
  810 PROCeasting
  820 PROCnorthing
  830 A$(K,1)=STR$(e)+STR$(n+2)
  840 A$(K,2)=STR$(e)+STR$(n)
  850 A$(K,3)=STR$(e+1)+STR$(n+3)
  860 A$(K,4)=STR$(e+2)+STR$(n+1)
  870 A$(K,5)=STR$(e+4)+STR$(n+2)
  880 VDU28,2,6,37,1:COLOUR129:CLS
  890 VDU5:MOVE50,150:PRINT'"Type in
4 FIGURES with no spaces and    then
press the RETURN key"
  900 GCOL0,2
  910 MOVE360,480:PRINT"A"
  920 MOVE360,280:PRINT"B"
  930 MOVE460,580:PRINT"C"
  940 MOVE560,380:PRINT"D"
  950 MOVE760,480:PRINT"E"
  960 VDU4
  970 COLOUR2
  980 Score=0
  990 FORI=1TO5
 1000 PRINT'"What is the 4 figure gri
d reference":PRINT"for the square ";B
$(I)"?"'
 1010 INPUTAnswer$(K,I)
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
 1020 IF LEN(Answer$(K,I))<>4 VDU11:P
RINT"NOT 4 FIGURES":A=INKEY(200):CLS:
GOTO1000
 1030 chinp=0
 1040 PROCcheckinput(4)
 1050 IF chinp=1 CLS:GOTO1000
 1060  IF Answer$(K,I)=A$(K,I) Score=
Score+1:ELSE Answer$(K,I)=Answer$(K,I
)+STRING$(6," ")+"WRONG"
 1070 CLS
 1080 IF I=6 ENDPROC
 1090 NEXT I
 1100 ENDPROC
 1110 DEFPROCgrid
 1120 FORI=320TO920STEP100:MOVEI,200:
DRAWI,650:NEXT
 1130 FORI=225TO625STEP100:MOVE305,I:
DRAW945,I:NEXT
 1140 ENDPROC
 1150 DEFPROCeasting
 1160 X=RND(-TIME)
 1170 east=RND(93)
 1180 IFeast<10GOTO1170
 1190 e=east
 1200 VDU5
 1210 FORI=290TO900STEP100:MOVEI,190:
PRINTSTR$(east)
 1220 MOVEI,690:PRINTSTR$(east)
 1230 east=east+1
 1240 NEXT
```



What is the 4 figure grid reference
for the square B?

?7227

Type in 4 FIGURES with no spaces and
then press the RETURN key

```
1250 VDU4
1260 ENDPROC
1270 DEFPROCnorthing
1280 north=RND(95)
1290 IFnorth<10GOTO1280
1300 n=north
1310 VDU5
1320 FORJ=240TO640STEP100
1330 MOVE230,J:PRINTSTR$(north)
1340 MOVE970,J:PRINTSTR$(north)
1350 north=north+1
1360 NEXT
1370 VDU4
1380 ENDPROC
1390 DEFPROCtest2
1400 VDU19,0,4,0,0,0
1410 COLOUR128:CLS
1420 PROCgrid
1430 PROCeasting
1440 PROCnorthing
1450 VDU28,2,6,37,1:COLOUR129:CLS
1460 VDU5:MOVE50,125:PRINT"Type in 6
 FIGURES with no spaces and":MOVE50,7
5:PRINT"then press the RETURN key"
1470 VDU4
1480 FORI=6TO10
1490 chinp=0
1500 VDU5
1510 y1=237
1520 x=RND(-TIME)
1530 y=RND(3)
1540 x1=RND(8)
1550 IFx1<3GOTO1540
1560 x=x1*100
1570 y1=y*100
1580 IFI=6 x=x+5:e$="0":n$="0"
1590 IFI=7 x=x+55:e$="5":y1=y1+50:n$
="5"
1600 IFI=8 x=x+25:e$="1":y1=y1+85:n$
="9"
1610 IFI=9 x=x+90:e$="9":y1=y1+15:n$
="1"
1620 IFI=10 x=x+55:e$="5":n$="0"
1630 A$(K,I)=STR$(e+(x1-3))+e$+STR$(
n+y)+n$
1640 GCOL0,2
1650 MOVEx-25,237+y1:PRINTSTR$(I-5)
1660 MOVEx,237+y1:PRINT"*"
1670 VDU4
1680  PRINT'"What is the 6 figure gr
id reference":PRINT"for the * number
";I-5"?"
1690 INPUTAnswer$(K,I)
1700 IF LEN(Answer$(K,I))<>6 PRINT"N
OT 6 FIGURES":A=INKEY(200):CLS:GOTO16
80
1710 chinp=0
1720 PROCcheckinput(6)
1730 IF chinp=1 GOTO1680
1740 IF I<11 AND Answer$(K,I)=A$(K,I
)Score=Score+1:CLS:GOTO1790
1750 CLS
1760 PROCcheckx
1770 PROCchecky
1780 IF I=11 ENDPROC
1790 NEXTI
1800 ENDPROC
1810 DEFPROCsp
1820 PRINT'"PRESS THE SPACE BAR"
1830 Z$=GET$
1840 IFZ$<>" "GOTO1830
1850 ENDPROC
1860 DEFPROCcheckx
1870 z=0
1880 IFe$="0" AND n$="0"ANDAnswer$(K
,I)<>A$(K,I)Answer$(K,I)=Answer$(K,I)
```

in which both snakes and ladders are invisible. Players have to discover the position of squares where snakes and ladders begin.

Lineout offers an environment for rule discovery in which things can be tried and their results discussed. It also develops estimation techniques.

MXplusC is a game in which the player claims as many whole number coordinate plots as possible by drawing straight lines across a grid. These are specified by entering the values of m and c, the gradient and intersection with the y axis.

Ncroach is played on a board with 100 squares which players take turns to try and occupy by entering numbers which – if they bear an arithmetic relationship to those of the squares – allow territory to be taken, until the board is full.

Ghosts is an arcade game which reinforces knowledge of the conventions for naming points in the usual coordinate system. The game's scoring is biased in favour of the less well known quadrants.

Music 1, for any age group, contains Compose – a simple program that allows pupils to compose tunes from musical phrases. It comes with a number of standard sets of phrases and an editor enabling users to create their own.

Maths 1,2,3 and 4, and Music 1 cost £12 each.

Also available from Nottingham University is a video, made by the School of Education television unit, based on two mathematics lessons where a BBC Micro is used as a teaching aid.

It shows mixed ability classes of 11 and 12 year olds. One uses the Salesman program from Maths 1 and the other uses Zoom from Maths 2. The VHS tape costs £20.

Digital backing

BBC Micro music specialist Rice Computer Electronics has brought out a digital drum unit add-on with a built-in synthesized bass guitar voice and software containing a 1,000 note sequencer.

This means the micro can play digital drums and synthesized bass guitar at the same time – and even perform as a backing duo.

The two tracks are available on two output sockets on the unit and can be mixed independently, with sound treatment if required.

The sound library actually contains digital drum waveforms generated by computer, which enable unique sounds to be produced, and these can be displayed on screen with the aid of an editor.

Combined synthesized bass and digital drum unit, with software, costs £85. The drum unit alone, with software, costs £47.50.

Modem support

FIRST in a new generation of comms products from PMS Communications is Dialup Educational for the BBC Micro.

It can be used with all modems currently in schools, says PMS, and it supports Xmodem, Kermit, CET telesoftware download and BT's multistream Epad protocols.

In addition, file transfer protocols such as Kermit can be superimposed on character level protocols such as Epad for increased reliability on data transfer.

The package also includes a tutorial disc which allows pupils to be trained in the use of services like Prestel Education, TTNS and Neris without using a telephone.

Dialup Educational costs £79.95, £195.95 when packaged with the Schools Modem from Miracle Technology.

Printing facilities

AFTER two years research and nationwide trials at several levels of education, the Folio 1.0 word processor for children has been released by Tedimen Software.

The software features a range of printing facilities, which employ correctly shaped and spaced letters.

And these were widely used in the 10-month trial period in schools for making up work

From Page 67

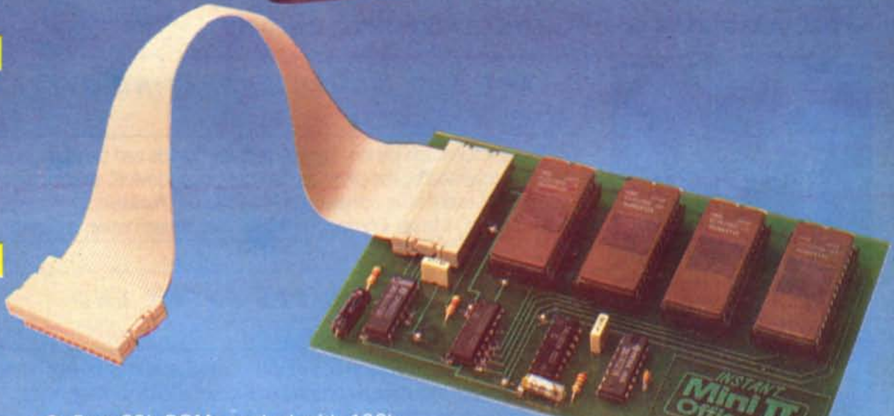
```
+STRING$(4," ")+"WRONG":ENDPROC
 1890 cx=VAL(e$):cxx=VAL(MID$(Answer$
(K,I),3,1))
 1900 IFcx=9 AND cxx=cx-1 z=1:ENDPROC
 1910 IFcx=9 AND cxx=cx z=1:ENDPROC
 1920 IFcx=1 AND cxx=cx+1 z=1:ENDPROC
 1930 IFcx=1 AND cxx=1 z=1:ENDPROC
 1940 IFcx=5 AND cxx=cx z=1:ENDPROC
 1950 IFcx=5 AND cxx=cx+1 z=1:ENDPROC
 1960 IFcx=5 AND cxx=cx-1 z=1:ENDPROC
 1970 ENDPROC
 1980 DEFPROCchecky
 1990 IFe$="0" AND n$="0"ENDPROC
 2000 cy=VAL(n$):cyy=VAL(MID$(Answer$
(K,I),6,1))
 2010 IF z=1 AND cy=5 AND cyy=cy+1 Sc
ore=Score+1:ENDPROC
 2020 IF z=1 AND cy=5 AND cyy=cy-1 Sc
ore=Score+1:ENDPROC
 2030 IF z=1 AND cy=5 AND cyy=5 Score
=Score+1:ENDPROC
 2040 IF z=1 AND cy=9 AND cyy=9 Score
=Score+1:ENDPROC
 2050 IF z=1 AND cy=9 AND cyy=cy-1 Sc
ore=Score+1:ENDPROC
 2060 IF z=1 AND cy=0 AND cyy=0 Score
=Score+1:ENDPROC
 2070 IF z=1 AND cy=1 AND cyy=1 Score
=Score+1:ENDPROC
 2080 IF z=1 AND cy=1 AND cyy=cy+1 Sc
ore=Score+1:ENDPROC
 2090 Answer$(K,I)=Answer$(K,I)+STRIN
G$(4," ")+"WRONG"
 2100  ENDPROC
 2110 DEFPROCnames
 2120 CLS:P=0
 2130 PRINTTAB(5,0)CHR$129"NAMES AND
SCORES"
 2140 FORI=1TONumber:PRINTNAME$(I)TAB
(16)Score(I):NEXT
 2150 IF P=1 VDU3
 2160 PRINT'CHR$131"PRESS P FOR A PRI
NTOUT":PRINT'CHR$131"PRESS SPACE BAR
TO CONTINUE"
 2170 X$=GET$
 2180 IF Prin=1 AND X$="P"P=1:VDU2:GO
TO2130
 2190 VDU3
 2200 ENDPROC
 2210 DEFPROCall
 2220  CLS:N=0:P=0
 2230 PRINTTAB(5,2)CHR$129"DATA FOR W
HICH PERSON?"
 2240  FOR J=1TONumber:PRINTNAME$(J),
J:NEXTJ
 2250 PRINT''CHR$131"TYPE IN THE NUMB
ER OF THE PERSON"
 2260 PRINT'CHR$131"PRESS RETURN AFTE
RWARDS"
 2270 INPUT N
 2280 IF N<1 OR N>Number PRINT"Number
 too high":GOTO2270
 2290 CLS
 2300 PRINTTAB(5,1)CHR$130NAME$(N)
 2310 PRINTTAB(1,2)CHR$131"Mark is ";
Score(N)
 2320 PRINTTAB(1,3)"Reference      Ans
wer"
 2330  FOR I=1TO10:PRINTA$(N,I)TAB(16
)Answer$(N,I):NEXT
 2340 IF P=1 VDU3
 2350 PRINT'"PRESS P FOR A PRINTOUT"
 2360 PRINT'"PRESS SPACE BAR TO CONTI
NUE"
 2370 X$=GET$
 2380 IF Prin=1 AND X$="P":P=1:VDU2:G
OTO2300
 2390 VDU3
 2400 ENDPROC
 2410 DEFPROCevery
 2420 CLS
 2430 IF Prin=1 VDU2 ELSE ENDPROC
 2440 FORI=1TONumber
 2450 PRINTNAME$(I)
 2460 PRINT"Score = ";Score(I)
 2470 FORJ=1TO10:PRINTA$(I,J)TAB(16)A
nswer$(I,J):NEXT
 2480 NEXTI
 2490 VDU3
 2500 ENDPROC
 2510 DEFPROCend
 2520 CLS
 2530 *FX229,0
 2540 *FX12,0
 2550 *FX18
 2560 VDU23;11,255;0;0;0
 2570 PRINT''"END OF PROGRAM":PRINT"
______________"
 2580 END
 2590 ENDPROC
 2600 DEFPROCcheckinput(M)
 2610 FOR L=1TOM
 2620 IF ASC(MID$(Answer$(K,I),L,L))<
48 OR ASC(MID$(Answer$(K,I),L,L))>57
VDU11:PRINT"NUMBERS ONLY ALLOWED":A=I
NKEY(200):L=4:CLS:chinp=1:ENDPROC
 2630 NEXTL
 2640 ENDPROC
 2650 *TAPE
 2660 FORI%=0 TO TOP-PAGE STEP4:I%!&E
00=I%!PAGE:NEXT
 2670 ?&13=?&13-(PAGE-&E00)DIV 256:PA
GE=&E00
 2680 RUN
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

INSTANT

DATABASE SOFTWARE
Mini Office II
BBC Micro
Mini Office II
Main menu
More powerful than ever!

Now on a power-packed ROM board – the BBC Micro's top-selling 6-in-1 package. Included in it are all the highly-acclaimed features of Mini Office II . . . plus many exciting extras.



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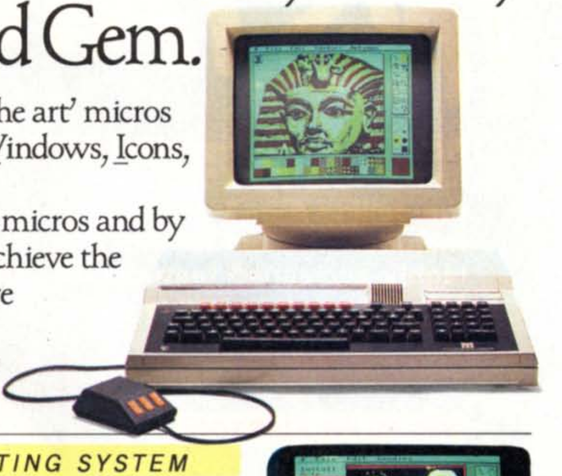

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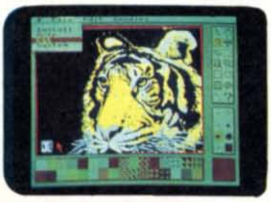

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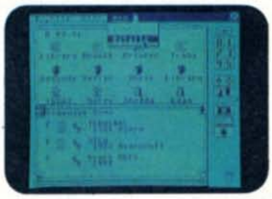

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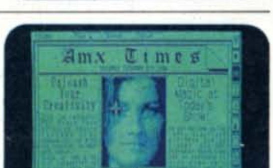

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A highly sophisticated CAD package allowing drawings such as a PCB design up to the most intricate architectural drawing.

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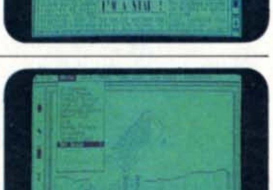

There is also a growing list of additional AMX software requiring the original AMX Art Rom or Super Art Rom including:
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Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Lethal connections

I HAVE been using the Watford Electronics Beeb Video Digitiser for a term with an Information Technology class. I agree with Mike Cannon's review in the December 1986 issue of Education Micro User *saying that it is an excellent product and has great educational potential.*

The reason I am writing is not to criticise but to bring to readers' attention the warning buried on page 16 of the manual – namely that direct connection to a TV without video out could be lethal.

As one of the many who usually tries a product first and then reads the manual when stuck, I think safety warnings should be on the cover of the manual not lost on page 16. Even better it should be on the product itself, especially when the word lethal is involved.

I suspect there are not many in education who would like to explain to parents that taking a photo of their son caused a death. – **Des Walshe, Orangefeld Boys' School, Belfast.**

Any more questions?

I AM extremely interested in your program Any Questions which appeared in the September issue of Education Micro User.

I find it very useful in the classroom in its present form, but in the introduction you say that a random element could easily have been introduced.

As my knowledge of Basic is rather poor could you please provide a random routine for the program? Questions should appear only once, of course, and I understand that I won't be able to use the results analysis, but that is of minor importance.

Moreover I intend to keep two versions: One with a random procedure and one without. – **S. Aalders, Dalfsen, Netherlands.**

● An article giving details of how to generate different random numbers was published in the very first issue of *The Micro User*.

The following program uses the techniques described there to print out N different random numbers, where N is set in line 20.

```
 10 X=RND(-TIME)
 20 N=20
 30 DIMA(N+1)
 40 FOR I=1TON:A(I)=I:NEXT
 50 FORJ=N TO 1 STEP -1
 60 IFJ<>1 R=RND(J) ELSE R=J
 70 PRINTA(R)
 80 FORI=R TO N-1
 90 A(I)=A(I+1)
100 NEXT
110 NEXT
```

Using the techniques illustrated by the above program, both the magazine and full versions of Any Questions can be changed to output all the questions in a random order.

The following lines need to be changed or inserted:

```
  8 X=RND(-TIME)
511 DIMA(NQ%+1)
531 FORI=1TONQ%:A(I)=I:NEXT
535 FORZZ%=NQ% TO 1 STEP-1
536 IFZZ%<>1 R=RND(ZZ%) ELSE R=ZZ%
537 QN%=A(R)
538 FORI=R TO NQ%-1:A(I)=A(I+1):NEXT
540 CLS:PRINTTAB(0,1)" This is questio
n number "STR$(NQ%-ZZ%+1):PRINT'" "Q$(QN
%,0):PRINT'" Press the key corresponding
 to the       correct answer......":FORI%
=1TONR%:PRINT'" "CHR$(I%+64)"....."Q$(QN%
,I%):NEXT
```

If you only want, say, any 5 questions selecting from a file containing 20, the following lines need changing:

```
535 FORZZ%=NQ% TO 1+NQ%-5 STEP-1
560 NEXT:CLS:PRINTTAB(0,5)" You got "S
TR$(MK%(PN%))" right out of 5":PROCPRESS
```

Academic question

IN THE October issue of Education Micro User *you mention four new programs from Academic Software. The two that interest me are Boat Hull Design and Kitchen Planner.*

Could you please give me an address for more information. – **K.W. Burrough, Formby.**

● Academic Software can be found at Sourby Old Farm, Timble, Otley, Yorks, LS21 2PW.

cards, overhead projector transparencies and labelling display work.

Extensive configuration facilities allowed schools to first set up discs which hide the advanced features, creating an environment for exploring word processing.

Folio has also been widely used with Concept Keyboards. A teacher working with four to six year olds used Folio with overlays based on a reading scheme to produce a display of infant computer work.

The version of Folio distributed to education computer advisers last April contained a number of features refined after earlier trials in Ealing, Coventry and Hampshire schools.

These included large clear proportionally spaced letters suitable for juniors, a simple menu system with a range of safety nets to build confidence, and the hiding of complex commands for the benefit of infants.

Multiple fonts include cursive script and newspaper typeface, there is on-screen underlining, an advanced search facility Leap, and Learn – a simple way of performing repetitive commands.

It now also has full microspaced justification, and a series of links to Basic programs allowing various utilities to be incorporated into the Folio environment.

Local education authorities are charged a licence fee for Folio of 1.2p per child, which allows for unlimited use both at home and at school.

Authorities may also write Basic programs which use the Animator and Print Utility and distribute them to schools within their area without incurring royalties.

Licensed authorities can buy individual packs from Tedimen Software in quantities of 10 or more. The full pack with manual, 40 track disc and keystrip costs £3.85

Also available are 40 track formatted Tedi discs set up as Folio work discs and containing the relevant parts of the program.

The "make new disc" facility of Folio will transfer the current configuration on to the new Tedi disc.

This has been designed so that novice users can make their own discs simply, and to ensure that the most up-to-date version of Folio is in use.

MicroCodil .. moving towards intelligent interaction

By GABRIEL JACOBS

A WHOLE generation of schoolchildren has come to realise that micros can be bad teachers. Infinite patience they may have, but they soon lose respect if they fail to distinguish between a typing error and a disastrous howler, or if some elementary omission in a data structure jams up the works.

What has been needed for some time is a language for micros designed to tackle the problems of intelligent interaction between human beings (not all human beings are programmers) and machines.

Codil, the brainchild of Chris Reynolds of Brunel University, was originally conceived as a very high level language for commercial information processing. It has been used for some time on mainframes in a variety of research fields, and was even chosen for a Jim'll Fix It TV programme to illustrate computer applications in education.

The source code and normal minimum workspace of Codil amount to about 250k, so until recently it seemed an unlikely candidate for small machines. But its clear potential in schools, not least as a tool for teaching information processing itself, has finally led to its being squeezed into the BBC Micro as MicroCodil, a revamped, modular version of the mainframe package.

The software will run on a BBC Model B, B+ or Master with the minimal 40 track single-sided disc. But with Help files, a dozen demonstration knowledge bases, worked examples, and extra library routines, the total file size is close to 300k. The cost is £50 for two double-sided 40 or 80 track discs, or £60 if provided as four single-sided discs. This price includes use in classes with up to five machines.

MicroCodil is neither procedural like Basic or Pascal, nor functional like Lisp. It is a logic language built

HANDLING UNSTRUCTURED DATA

SOME of MicroCodil's system words represent concepts which may seem unfamiliar to procedural programmers. There are functions such as APPROX, THRESHOLD, PROBABILITY, MATCH, ISA and the like.

Many of them are tools for handling messy, ambiguous, and even contradictory data, so that MicroCodil is able to take in its stride concepts such as:

Multiple and missing values: Whereas in ordinary database languages, a programmer must declare which elements have unique values, and which need some special code to allow them to have more than one value, the fact that an item appears once, several times, or not at all in a knowledge base causes MicroCodil no problems whatsoever. All data structures are variable, and there are no such things as well-defined records or pre-defined fields.

Range evaluation: MicroCodil takes a query about a single item to mean the actual presence of that item, or its implied presence within a range.

Fuzzy matching: MicroCodil will partially match strings by slicing, the equivalent in Basic of MID$ and so on, but will also match them approximately, the amount of approximation being defined by the user. Tests for possible typing errors, for example, can be as subtle as one wishes, and relatively simple to set up, and it is possible to use a file to provide complex fuzzy definitions in terms of other items, which may themselves have fuzzy definitions.

Numeric values can also be subjected to fuzzy matching, with the approximation being defined if necessary in terms of standard deviation from the norm.

Probability: The default value here is 1, so the fact that a probability test is always applied to items being processed is normally hidden from the user. But the probability threshold of any item can be adjusted. In a wildlife knowledge base, say, the user could ask for the probability of a rise in the baboon population if rainfall increases by approximately 7 per cent over the next six months. The answer will be the result of compounded probabilities automatically calculated by MicroCodil.

Dynamic Evaluation: MicroCodil is able to deduce the value of an item from other items in a knowledge base. In practice this means that it performs arithmetic rather like a spreadsheet. For instance, the expression:

AGE: = DEATHDATE – BIRTHDATE

could be used if AGE has been omitted when setting up the knowledge base. This also allows one knowledge base to be used for different purposes.

Hierarchies: ISA is a function for creating relationships between items. For example, the expressions:

ORANGE (ISA) FRUIT
FRUIT (ISA) FOOD

tell MicroCodil two things it may need to know about the item ORANGE. Relationships can become as complex as any found in symbolic logic, but the user need only think of them as discreet units, leaving MicroCodil to handle the way they interact with each other.

round a central decision making unit, and expects the user to handle or ask questions about information contained in a knowledge base. It therefore has affinities with relational databases, and with Prolog, but in many respects is in a category of its own.

It provides an environment based on a psychological model. Whereas most languages require a regular structure in the data they access, MicroCodil accepts and manipulates poorly defined information, as we ourselves do (see panel).

Just as the human mind holds data for short-term processing without necessarily committing it to long-term memory (remembering a telephone number for long enough to dial it), so MicroCodil has a continuously updated short-term working memory, called The Facts, to deal with active chunks of information.

Conventional languages distinguish between instruction code and data. MicroCodil does not. Any item in a knowledge base can be an instruction, an operation, a function, or simply information, depending on the context.

In a relational database, structured data is reorganised, in a process called normalisation, into tables of columns and rows, each table being stored as a file. MicroCodil, on the other hand, automatically stores all its information as items linked as subsets, properties or functions of other items. It can therefore simulate normalisation even with badly structured information.

It has to be said that MicroCodil is not as efficient as Prolog when it comes to closed logical problems. In a family database, for instance, if you are concerned solely with precise relationships such as "second cousin", Prolog would be the language to use. But if you are interested primarily in scattered facts about people, MicroCodil is better. And whereas adding information which does not fit the original data structure can involve the Prolog user in extra logical rules, and a proliferation of nested brackets the operation in MicroCodil is t [illegible].

MicroCodil can at first be a tricky language to handle properly if you are used to procedural programming. But if you can rid yourself of preconceptions, or, better still, if you don't yet have any, you will in fact find it easier to learn than conventional languages (see examples panel).

To help you along, MicroCodil has been provided with a very comfortable user-interface, with excellent use of colour coding and menus, and a well designed screen layout.

In addition to some status lines, the screen is divided into three windows, a 15-line main area, a two-line message window and a four-line input window.

The main area is a multi-purpose frame for nine further windows. For instance, within it the FACTS

→

EXAMPLES OF MICROCODIL

THE basic MicroCodil building blocks are called items. An item can be a single word or a list of other items, and can have various properties, indexes and keys associated with it. A statement is a numbered list of items. The order of the items in the statement is immaterial. A file of statements is called a construct.

Let's assume we have created a crime knowledge base, without being sure of some of the facts. A couple of statements might look something like:

```
1 NAME = SMITH
2  CRIME = BURGLARY
3   CRIME = FRAUD
4    CONVICTIONS >= 4
5     CONVICTIONS <= 6
6      MONTHSPRISON = 37
7       SENTENCELENGTH = 44

1 NAME = JONES
2  PROFESSION = ACCOUNTANT
3   CRIME = ROBBERY
```

Notice that MicroCodil accepts missing or duplicated fields. The ambiguity between BURGLARY and ROBBERY can if necessary be solved with little difficulty, and remission calculated with:

```
REMISSION: = SENTENCELENGTH –
        MONTHSPRISON
```

Setting up a construct to produce some simple fuzzy matching might go as follows:

```
SL (SYNONYM) = SENTENCELENGTH

SENTENCELENGTH (CONDITION) SERVERTYPE

          SERVERTYPE (DEFINE)
          1 SL = Long server
          2     SL > 60
          1 SL = Medium server
          2     SL > 35
          3        SL <= 60
          1 SL = Short server
          2     SL <= 35
```

There is no limit to the complexity of conditional relationships that can be built into such constructs.

If the statement describing SMITH is held in The Facts, the following questions will generate a response of TRUE:

```
NAME (APPROX) = Smyth ?
SENTENCELENGTH (APPROX) = 43 ?
CRIME = Fraud ?
CONVICTIONS = 5 ?
CONVICTIONS > 2 ?
REMISSION > 6 ?
SENTENCELENGTH = Medium server ?
```

From Page 73

window displays what is being held in short-term memory, the TRACE window what decisions and actions have been taken so far, and so on.

VIEW provides a summary of what can currently be seen through the principal windows, and any window can be frozen while the system continues to run. Conversely, REPORT displays MicroCodil's processing activity, so that an account of what the package is doing can be generated, and if necessary slowed down or even single-stepped. A HELP window, which can be called at any time, provides a view on to a series of comprehensive Help files.

The 240 page instruction manual is aimed partly at plain folk, partly at the established computer fraternity. Generally speaking, a reasonable balance has been achieved. There are worked examples and clear definitions, together with useful technical information on setting up new knowledge bases, editing and sorting MicroCodil files, and so on.

It is not possible in a brief overview to outline more than a few ncipal features of MicroCodil. There are 65 system words, very many of which provide facilities one would not expect to find in a conventional language, and a number of user-definable expansion facilities. Suffice it to say that the package has enorous potential, and is waiting for people to write knowledge bases to find the limits of its capabilities. ■

Program: MicroCodil
Price: £50 (disc only)
Supplier: Codil Language Systems, 33 Buckingham Road, Tring, Herts. HP23 4HG.

PROBLEM

I AM interested in graphics – mainly pictures. One problem is getting designs into the machine. Up until now I have spent hours coding the points and then typing them in.

I considered an AMX mouse, but it is difficult to trace using this device. I finally came up with an idea for a device similar to a pantograph. However I need some help with the analogue digital conversion routines. Can you oblige?

I thought you would be interested in the mechanism for your Body Building course. – Steve James, East Barnet, Herts.

SOLVED

If you look in the June 1983 issue of* The Micro User *you will find I have already covered that type of graphics input device.

In some cases the 10k preset adjusters do not provide enough control, so a 10k fixed resistor should be placed in series with each one. Otherwise you'll find the device described ideal for your use.

REPLAY

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"REPLAY is a pretty marvellous device, more than a toy for those who have to document software, very useful if you can only buy a tape version of a program (it doesn't matter what nooks and crannies the code is packed into) and a good opportunity to have fun with the screens of your choice. A liberating piece of software and highly recommended".
'Software Reviews',
A&B Computing, Dec. '85

"REPLAY is the current state-of-the-art answer to tape to disc transfer, available for the BBC B (and B+). This consists of a ROM and some hardware which must be attached inside the computer. Once installed it will cope with virtually any program you care to put to the test".
'First Byte',
ACORN USER, May, '86.

"Many facilities are advertised to enable BBC micro users to copy or back-up protected programs and transfer them from tape to disc. While some break the protection in the process and thus assist software piracy, others are more responsible, using techniques which retain the protection. Vine Micros, who already leads the field in the latter group with the T.D.ROM, now supplies REPLAY".
'ROM Roundup',
MICRO USER, July, '86.

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Opus.

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774-40588 Tlx: 8956095 Fax: 01 950 8989

All prices exclusive of VAT; subject to change without notice & available on request.

Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

BBC MASTER 128K Micro	£395
BBC MASTER TURBO 4MHz	£493
512K Processor Add on Board	£195

"inc. Mouse and GEM package"

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	Standard Package	£385
System 1A	System 1 + TV Modulator	£399
System 2	System 1 + Green Hires Monitor	£469
System 3	System 1 + Medium Res Colour Monitor	£599

SPECIAL OFFER

FREE . . . £80 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and Computer Concepts' popular Interword wordprocessor ROM; WHEN YOU BUY YOUR BBC MASTER or COMPACT COMPUTERS FROM US.

Turbo 65C102 Add-on Module	£99
BBC MASTER ET (Econet Terminal)	£315
Econet Module for the Master	£43
ROM Cartridges for Master	£13
Reference Manual I	(No VAT) £14
Reference Manual II	(No VAT) £14
Advance Ref. Manual	(No VAT) £19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Upgrade Kit	£42
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
6502 Acorn 2nd Processor package	£172
Z80 Acorn 2nd Processor package	£319
32016 Co-Processor	£999
Cambridge Workstation	£3450
ARIES IEEE Interface	£238
Acorn IEEE Interface Complete	£280
Acorn Teletext Adaptor	£95
Acorn Prestel Receiver	£115
Acorn Bitstick I	£299
Robocom Bitstick II	£759
Upgrade for Bitstick I to II	£450
Bitstick Multiplotter Driver	£65

(Securicor carriage £7)

CO-PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B+. With this brand new launch from Watford Electronics. You can attach any BBC Master Co-processor to the original BBC Micro. Once again Watford forges ahead with a new concept in BBC micro addons. This unique external CO-PRO ADAPTOR, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor it supercedes.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs.

To use this addon you require a BBC model B, fitted with DNFS 1.20 or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly as if they were second processors. Master owners may use this interface to add a second Co-processor.

Watford, brings power to your BBC at only:

£50.00 (carr £5)

EXTENDED WARRANTIES NOW AVAILABLE – WRITE FOR FURTHER DETAILS

By popular demand our retail shop is now open until 8.00pm. every Thursday.

VARIOUS PRINTERS

● EPSON FX85 Printer	£315
● EPSON FX105 Printer	£430
● EPSON JX-80 Colour Printer	£420
● EPSON Hi-80 Printer Plotter	£319
● EPSON Paper Roll Holder	£17
● EPSON LX86 Printer	£215
● EPSON LX80/86 Tractor Feed	£20
● EPSON LX80/86 Sheet Feeder	£49
● Brother HR20 Daisy Wheel	£329
● Centronics Printer Cable to interface all the above Printers to BBC	£6

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£2"	RS232 + 2K Buffer	£55
IEEE 488	£65	RS232 & 8K Buffer	£75

CENTRONICS GLP & Brother M1009 (NLQ) Printers

A major price break-through in NLQ Printers from Watford.

At last, a low cost full feature printer,supplied complete with Watford's own NLQ ROM (separately at no extra cost). Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

Features include, Epson RX Compatible commands, Near Letter Quality print, 50 CPS Draft mode, Centronics parallel interface, Single, Double & Quadruple density graphics modes, Subscript & Superscript, handle up to 9½" wide standard paper, Friction Feed standard, Low cost Tractor feed optional extra, Bi-directional logic seeking.

Special Offer ***£89*** *(carr £5)*

Tractor Feed Attachment ***£5***

PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	£60
Connect 6 BBC Micros to 1 Printer	£129
PRINTER CHANGER	
Connects 3 Printers to 1 Micro	£65

(Cables extra)

Acorn-Olivetti JP101 Spark Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only

£59

Pack of 4 refills **£10**

FREE – Spark Dump Rom worth £15 with every printer purchased with us

JP101 Sparkjet Dump Rom £15

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £2.50
27128-250nS £2.75

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.90
2 × 6264LP (16K) £5.80

NEW

KAGA 815 Printer
Only £349 (carr £7)

NEW

KAGA KP915 Printer
Only £369 (carr £7)

Kaga RS232 Interface	£49
Kaga RS232 Interface & 2K Buffer	£69
Kaga RS232 Interface & 16K Buffer	£95

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£12

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Brother HR15	£3.00	-
FX100	£7.00	£5.25
FX80-MX80-FX85	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
GP80	£4.50	£4.00
GP100-GP250	£5.95	£3.95
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
CANON PW1080	£5.25	£4.75
Panasonic KX1080	£7.75	£4.75
Microvitec Metal Monitors	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

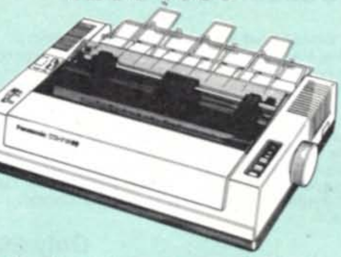
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Panasonic KX-P1080



from the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

Available NOW at a superbly realistic price, the KX-P1080 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 100 cps of clear Draft text backs up the crisp 20 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

(Price inludes, FREE A 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £7)

Panasonic RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

A few months ago, we introduced the KX-P1080 to our large and discerning customer base. As a result of the enthusiastic and overwhelming reaction to this versatile dot matrix printer (see above for details), we are now extremely pleased to be able to bring you details of the fabulous KX-P3131 Daisywheel Printer, also from Panasonic. The KX-P3131 printer is the ideal printer for the home user wishing to produce clear, immaculate letters or reports.

Ideally suited to the pocket of the home user, costing not much more than a pair of disc drives, this daisywheel printer delivers flawless text at 10, 12 or 15 characters per inch. It also supports proportional print mode.

Printing at a respectable 17 characters per second, the KX-P3131 features a capacious 6 kilobytes printer buffer to swallow most printing requirements with ease. For the more demanding user, there is a 32 kilobytes printer buffer option available. Taking paper up to 13.5" wide, the KX-P3131 prints with bidirectional logic seeking, ensuring the minumum time to print your text.

Only **£225** (carr. £7)

Single Sheet Feeder	£195
Tractor Feed	£90

Acorn's Speech Synthesiser
Package

Complete with manual in its original packaging

Clearance price Only: **£16**

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

● 1431 – Medium resolution as used on the BBC television computer programme	£172
● 1451 – High resolution, suitable for word processing in mode 0	£225
● 1441 – High res, exceeds the capabilities of the BBC micro	£365
● 1431AP RGB + PAL and AUDIO	£199
● 1451AP RGB + PAL and AUDIO	£255
● **TOUCHTEC** Touch Screen Pack	£250
● Dust Cover for Microvitecs	£5.50

KAGA-TAXAN 12"

● KAGA KX1201G Hi-res Green Monitor	£90
● KAGA KX1202G Long persistence Hi-Res Green Monitor	£95
● KAGA KX1203A Ultra-Hi-Res Amber Monitor	£95
● KAGA Vision 2 Hi-res RGB Colour monitor. Ideal for Wordprocessing	£260
● **Kaga Super Vision 3,** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	£320

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	£69
Amber (New Design) Hi-res	£74

LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for KAGA	£3

N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES

for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

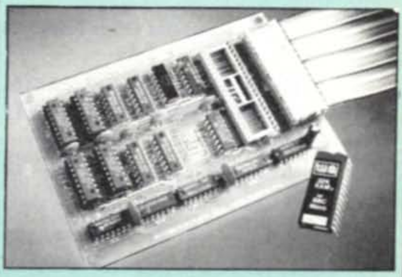
A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £89 (carr £2)

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B¿ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only(£59 (carr £2)

(Price includes a comprehensive manual and the ROM)

Continued →

Mark II Light Pen

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor. The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Special Offer Price: £15

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST

Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

● *Complete Disc Interface Kit including DFS ROM aand fitting instructions*	**£58**
● *Acorn's 0.90 DFS Kit complete*	**£52**
● *DFS Manual (Comprehensive)*	*(no VAT)* **£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).	
● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**
● *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**	
● *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM comes a special label with LOGO and serial number.*	

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

● *Complete DDFS Kit incl. fitting instructions*	**£46**
● *DDFS Manual*	*(no VAT)* **£6.95**
● *We will exchange your existing Single Density DFS Kit for our DDFS Unit at*	**£29**

BBC MICRO BUSINESS/ WORD/PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40-80 track double sided Disc Drives, Zenith Hi-Res green monitor, Panasonic KX-P3131 professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £899

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive[What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin[What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

STAK-PAK

The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

Five twin Packs incl.
10 Cassettes Only: **£5**

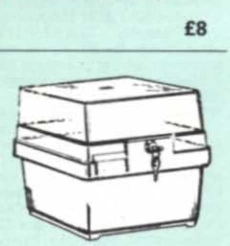
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

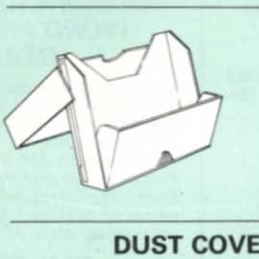
£8

LOCKABLE DISC STORAGE UNITS

Strong plastic case that affords real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



● M35 - holds upto 50 discs	**£8**
● M85 – holds upto 95 discs	**£10**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) ***£3.20*** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

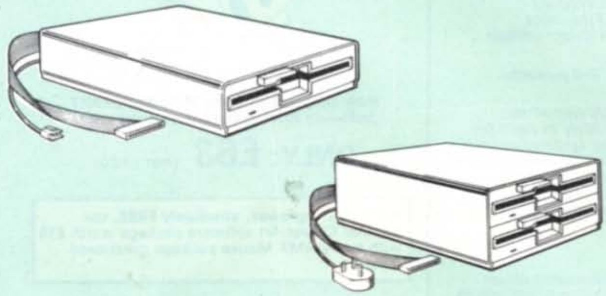
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

COMPACT DISC DRIVE CABLE

Single £9 Twin £12



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£10***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£12***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£15***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£15***
● *Hi-Density 10 × 5¼" 1.6M D/S D/D for IBM*	***£32***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£20***
● *10 × 3½" D/D D/D 40/80 track Discs*	***£24***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 ×* ***M3*** *3½" D/S D/D 80 Track Discs*	***£20***
● *10 ×* ***M4*** *5¼" S/S D/D 40 Track Discs*	***£9***
● *10 ×* ***M5*** *5¼" D/S D/D 40 Track Discs*	***£11***
● *10 ×* ***M7*** *5¼" D/S D/D 80 Track Discs*	***£14***
● *3" Double Sided Discs*	***£3*** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 80T	D-S 80T
● Without Sleeves	£49	£74
● With Sleeves	£50	£75

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

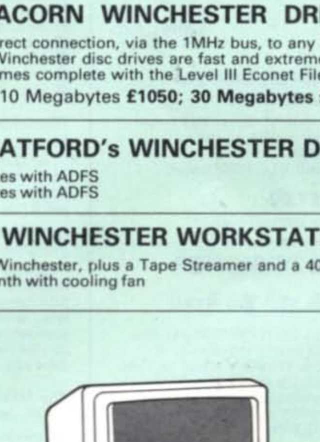
WATFORD's WINCHESTER DRIVES

● 20 Megabytes with ADFS	£635
● 40 Megabytes with ADFS	£999

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

CDP 800S **CDPM 800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £210

CDPM 800S for Master £225
(Securicor Carr. £7)

EPSON NLQ ROM
for the BBC Micro
A
B
R
S

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80-100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE; VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80) ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set) Standard 'pica size') Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

(Hi-View compatible)

THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810-910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.
Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

A 40 or 80 track (please specify) FONT Disc containing 9 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines(
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provides) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of ßGIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

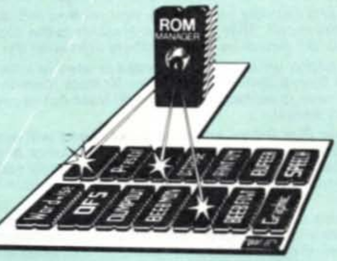
Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally etc.

Price including comprehensive manual

£25

ROM MANAGER



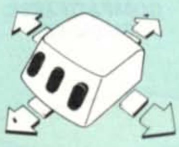
Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £20

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£42
AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse	£34
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£19
AMX MAX(A gem of desktop (ROM)	£17

RB2 MARCONI TRACKER BALL

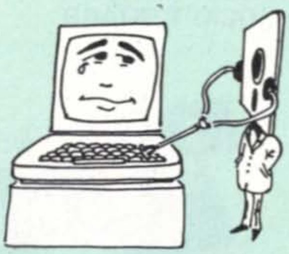
This popular unit is supplied complete with software.

Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.
At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC Publication's Popular Educational Software

● Maths with a Story 1 (Cassette). 4 primary level maths programs	£10.95
● Maths with a Story 2 (Cassette) 4 further maths programs	£10.95
● Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	£19.95
● WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
● RELATIONSHIP: Science (Disc) O Level Biology program.	£14.95
● BONDING: Science (Disc) O Level Chemistry program.	£14.95
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	£14.95
● ELECTRONICS IN ACTION (Disc) O Level program	£14.95
● NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	£20
● ECOLOGY (Disc) O Level program.	£20
● POLYMERS (Disc) O Level program.	£20
● Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20
● FOOD & POPULATION (Disc) O Level program.	£20
● MICROTECHNOLOGY (Cassette) O Level program.	£6.95
● A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	£17
● DEUTSCH DIREKT! (Disc & Audio Cassette)	£20

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

ROM-SPELL

"way ahead of any competition"

ENGLISH DICTIONARY
ROM-SPELL

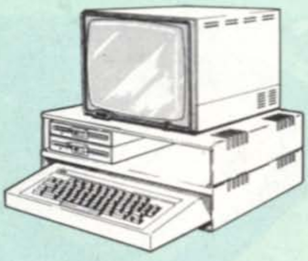
ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.
"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."
"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".
". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".
". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP-M and MSDOS, namely Spellstar and has a speed-performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".
". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".
Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

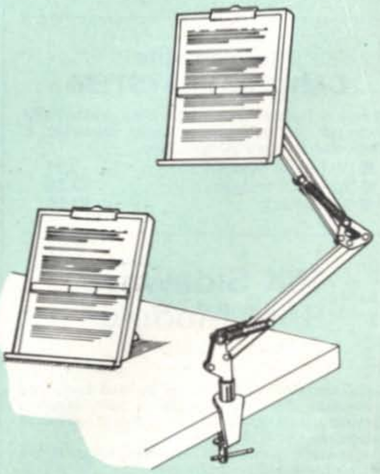
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper - from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

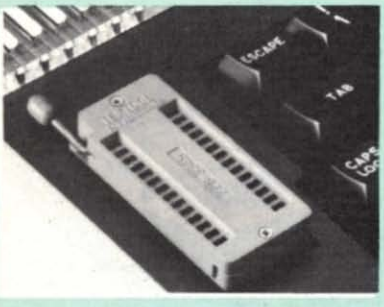
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition tc the Watford range of products are(

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

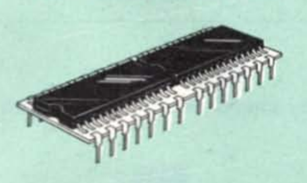
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.
Do you require:

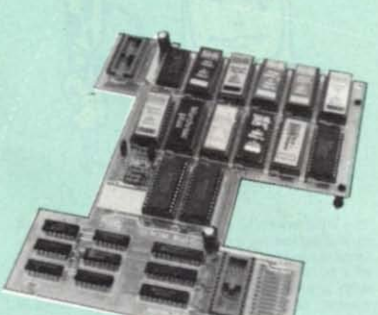
- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc[Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

NEW

THE BBC + Micro ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

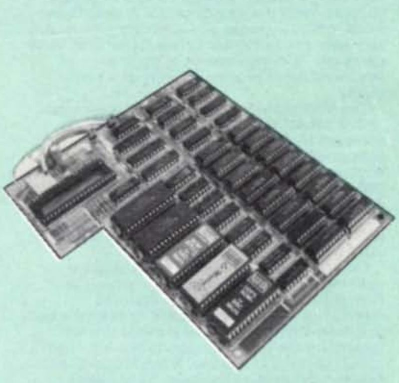
With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

£79 (carr £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM **£39***
- ROM/RAM card with 64k dynamic RAM ***£52***
- ROM/RAM card with a massive 128k dynamic RAM ***£80***

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit **£6***
- *16k Dynamic RAM for Upgrade **£7.50***
- *Battery backup **£3***
- *Read and Write protect switches .... **£2** each*

*Complete ROM-RAM board (all options installed) **£89***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE Membership to MicroLink.*
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£99

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £87**
COMMSTAR ROM package only (P&P on modem £2.00)	£29
Auto Dial-Auto Answer Board (non BABT)	£48
Auto Dial Utilities Disc	£9.50
OBBS Bulletin Software	£20.00

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- FREE membership to MicroLink.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75**
(Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
Graphics ROM	£23
TERMI	£27
COMMUNICATOR	£49
SPEECH ROM	£26
Printmaster	£24

Wordwise

£25

Wordwise plus

WORDWISE PLUS
£38

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET ONLY £38

INTER-CHART ONLY: £26

Inter-WORD

Only: £44

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

Only: **£39**

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37

VIEW 3.0 ROM

Price: Only **£56**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£12**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW-VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

MINI OFFICE II (tape)	**£14.50**

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

النور

ARABIC ROM
for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

20, 40 and 80 column operation. Compatible with ASMO (449). English-Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

VIEW PRINTER DRIVER ROM

(Professional facilities for demanding users)

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234-33383

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

ARIES CORNER

Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

OFFICE MASTER

Office Master

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**
(Cassette or Disc)

OFFICE MATE

Office Mate

- DATABASE
- BEEBCALC SPREADSHEET
- BEERPLOT GRAPHICS
- WORD PROCESSOR

DATABASE – Set up a computerised "card index" system and add records/data to the file your way. Features include search, sort, mathematical calculations, printer routines, data summaries, etc.

SPREADSHEET – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT – Provides an easily assimilated visual representation of numerical data.

WORDPROCESSOR – Provides many routines found in large and expensive packages.

OFFICE MATE Only £10
(Cassette or Disc)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM ONLY £16

DATAGEM

Gemini's popular Database package
Only: £34

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom

Life & Business Organiser

TAKE IN A-W

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17

D D D Suite Integrated Software System

-BASE **£12**
-CALC **£12**
-PLOT **£12**
COMBO PACK All 3 together **£26**

Continued

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Programming the	£22.95
6809, Programming the	£16.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced User Guide for BBC	£15.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC Forth	£7.50
BBC Micro & the small Business	£5.75
BBC Master 128 High Flyer	£10.95
BBC Micro Advanced Ref. Guide	£10.95
BBC Micro Advanced Programming	£10.00
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Disc Companion	£8.95
BBC User Guide	£10.00
BCPL User Guide	£14
Complete FORTH	£6.95
CP-M-86 User's Guide	£19.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Graphs ? Charts on BBC Micro	£7.50
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Interfacing & Robotics on BBC	£15.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO-PASCAL Reference Manual	£9.95
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
LISP the Language of Artificial Intelligence	£9.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
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S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View 3.0 User Guide	£10
View Guide	£4.50
Viewsheet User Guide	£10
Viewstore User Guide	£10
Using BBC Basic	£4.95
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

EPROM PROGRAMMER

The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette-disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£6.99**

ATTACHE CARRYING CASE for BBC Micro

This attache carrying case is attractively finished in mottled antique brown leatherette. An ideal and safe way of carrying your BBC Micro around. Supplied with two Keys.

Price: **£13** (£2 carr.)

28 pin ZIF SOCKET (Textool)	**£6.95**

28pin DIL HEADER PLUG

SOLDER type	£1.50
IDC CRIMP type	£1.95

SPARES for BBC Micro

Keyboard	£46	Keystrip	£2
UHF Modulator	£4	Case	£25
Speaker Grill	£1	Speaker	£2
Power Supply	£59	Keyswitch	£1.50

Replacement FLEXIBLE Keyboard Connector £3

8 WAY DIP SWITCHES

With these DIP switches soldered to their keyboard, any BBC B or B+ owner can take full advantage of the fast disc drives that we supply by configuring his BBC for fast disc drive operation.

Excellent value for money at **£1.00**

CONNECTING LEADS

(All ready made and tested(

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

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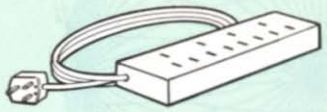

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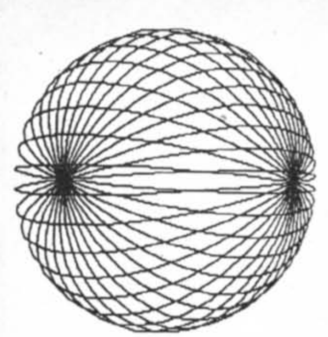

```
((  \ draw a ball using circles
DO
    FROM  5   BY  10   TO  175
LOOP
    \ pitch back by loop index
    \  and apply 40 degree yaw
    ROTN 0,#X,40
    \ then draw a full circle
    ARC 360,400
END_DO
))
```

```
( shown above and opposite  are
  examples of 3D GRAPHICS using
  built-in  HALCIEN  keywords )
```

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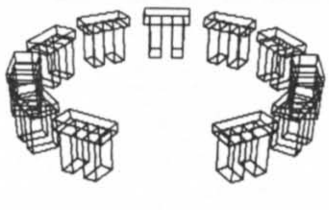

```
PROC 'PI_BOXES' \ 3 boxes set
ICON 3D \ up as a 'PI' symbol
POSN  -75,0,50 BOX 50,100,200
POSN   25,0,50 BOX 50,100,200
POSN -100,0, 0 BOX 200,100,50
END_IC
END_P

((  \ draw a ring of PI_BOXES
DO
    FROM 30  BY 30  TO 330
LOOP
    3D POSN 0,0,1500
    \ roll by loop index &
    \  pitch by 60 degrees
    ROTN #X,60
    2D GAP 0,-600
    PI_BOXES
END_DO
))
```

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Matrix algebra without fears

Trevor Roberts reviews Matrix Rom from Vine Micros

THE Matrix Rom from Vine Micros allows us to treat Basic arrays as matrices and take advantage of the powerful techniques of matrix algebra using only simple commands from Basic.

Having said that, don't let the word algebra put you off. While a knowledge of matrices is needed to use it to the full, the Matrix rom does have facilities that any non-mathematical programmer will find useful.

In effect the rom adds a new set of keywords to the Basic already present in the micro. These are available to you from anywhere in a Basic program and can be used as easily as MOD or SIN.

They can be roughly classified as matrix-handling commands, general array commands and others.

The matrix commands work on both one and two dimensional arrays. These arrays are declared before use with a DIM as usual.

From there on, things are different. In normal Basic when you want to manipulate an array you have to take every element in turn, one after another. Nested FOR...NEXT loops tend to be the order of the day.

With the new commands in the Matrix rom, you can treat the array (or matrix) as a whole. One operation on the matrix can affect every individual element in that matrix.

Assuming three 2D arrays A, B and C have been dimensioned, let's deal with the specifically matrix-orientated commands.

The rom allows us to add matrices with commands such as:

```
MAT A=B+C
```

The MAT warns the micro that it's a matrix command that's to be interpreted. The rest of the line reads just as normal Basic except now two matrices are added and the result stored in a third instead of the more usual variables.

As you might guess, in addition to matrix addition there's matrix subtraction, achieved with:

```
MAT A=B-C
```

If you've ever had to find the sum or difference of every corresponding element in a set of arrays, you'll understand what a boon these commands are.

Other, more specialised, matrix operations are available. A matrix can be made the unit matrix with:

```
MAT A=IDN
```

or made null (all elements zero) with:

```
MAT B=ZER
```

Square matrices can be transposed (each row becoming a column and vice versa) and inverted. There are also commands to multiply matrices, either by other matrices or by scalars (real numbers).

And matrices of the same dimensions can be made equal to each other with a command such as:

```
MAT A=B
```

which copies B into A.

While these operations may seem a bit obscure if you know nothing about matrix algebra, they are both practical and disarmingly simple to use.

And while matrix manipulation may seem a little obscure, some of the other, more general keywords will be of use to every serious programmer who uses arrays.

The first of these is the MAT DEL which is used to delete an array when it's no longer required. The point of this is that the memory used by that array is freed for use by other variables.

Complementing this there is the NEWDIM command which alters the dimensions of an already existing array. An array created using:

```
DIM A(3,3)
```

can have an extra element in each dimension added with:

```
NEWDIM A,4,4
```

The elements in the top left corner of the original array are left untouched. If you use the command to make an array smaller, say from 3x3 to 2x2, you lose elements in the bottom right of the array.

One really elegant feature of the Matrix rom is the RANGE command. This examines a row or column of an array and returns the values of the largest and smallest elements it finds there.

When you consider doing this in normal, unenhanced BBC Basic you'll see the value of the keyword.

Another useful command is SWAP. This can be used to exchange the names of either matrices or variables. So:

```
MAT SWAP A,B
```

has the array A becoming B and B becoming A. Try that in Basic!

It comes into its own when using procedures that operate on a particular array, say A. You can set up a series of other arrays such as B, C, D and swap them in and out of the same procedure as necessary.

It's not just arrays that can have their names swapped. The SWAP command without the preceding MAT allows variables of the same type to exchange names.

As well as making array manipulation simpler, the Matrix rom also makes it easy to deal with array input and output. The command:

```
MAT INPUT A
```

will have the micro prompting you to enter the values of the array elements row by row.

Once you've done this you can save the array to disc with:

```
MAT SAVE A,"Anarray"
```

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From Page 89

and recalled it with

```
MAT LOAD A,"Anarray"
```

Should you want to see the contents of a matrix, the rom has two ways of displaying them.

The first, MAT PRINT, displays all the elements of the array row by row. It follows the same rules for number display as BBC Basic's normal PRINT command. It's a lot better than the FOR...NEXT loops needed otherwise – you get the whole of the array for the price of one command.

The second display command is FPRINT which produces a rather more legible display of numbers than the normal PRINT command.

Finally there are two commands, SOL and BSOL, which are used to give the solutions of linear simultaneous equations and banded symmetrical linear simultaneous equations respectively. That would have been a boon in my sixth form days!

Just from this brief tour of the commands available with the Matrix rom, it's obviously got some very useful and powerful techniques, even for those who don't know their matrices from their vectors.

And don't let unfamiliarity with some of the terms make you think that the rom is hard to use. The opposite is the case. The commands are quickly learnt and easy to apply.

They're the sort of thing that you never knew that you needed – but once you've used them you won't want to be without them.

Should you be in doubt about anything:

```
*HELP MATRIX
```

provides a list of the commands available and their syntax. The rom also does its best to help with a series of error messages that are actually helpful, and do more than just point out that you've made a mistake.

The whole thing is backed by an excellent litle manual which concisely describes each keyword and the various options available. I just wish that all the white space in the manual were filled with more example programs.

However, that's not a criticism, it's just that I suspect there's a lot more to the rom than I've used. Certainly I've not covered all its features in this necessarily brief review.

All in all it's an excellent package. While at first it may seem to be aimed at mathematical whizz kids, the Matrix rom has something for every programmer who uses arrays.

And most science and engineering students or anyone using the micro for serious business or graphics applications should find it useful.

The Matrix rom is simple to use, yet fast and powerful in its applications. I have no hesitation in recommending it thoroughly. ■

*Table I: The output of *HELP MATRIX*

```
  BSOL <matrix>*<vector>=<vector>
  FPRINT <value>(,)(;)("<text>")
  MOPT <value>,<value>
  NEWDIM <matrix>,<row>,<column>
  RANGE <variable>,<variable>,<matrix>,<R/C><value>
  SOL <matrix>*<vector>=<vector>
  SWAP <variable>,<variable>
  MAT DEL <matrix>
  MAT INPUT <matrix>
  MAT LOAD <matrix>,<filename>
  MAT PRINT <matrix>
  MAT SAVE <matrix>,<filename>
  MAT SWAP <matrix>,<matrix>
  MAT + - * INV(m) TRN ZER IDN (k)*

 MOPT options :-
  1 : matrix preservation
  2 : row/column start
  3 : exponent of smallest number printable (base 2)
```

Product: Matrix Rom
Price: £36
Supplier: Vine Micros, Marshborough, Sandwich, Kent CT13 0PG.
Tel: 0304 812276

PROBLEM

I AM considering upgrading to a disc drive. I have read a little about interface kits and drives and have decided on a single sided 5¼in drive. How much would you expect to pay for this?

On actually using the drive my first job will be to transfer all my cassette programs to disc. Are there any problems with multi-part tape programs running on disc?

Lastly could you please tell me the baud rate of the DFS and give me some idea of how long it will take to load a long program such as Elite? – R. Lloyd, Notts.

SOLVED

If you get the March '84 issue of The Micro User *you will find all you need to know about disc upgrading although some of the prices quoted will be well out of date. You'll find offers for back issues on Page 159 of this magazine.*

As to transferring commercial programs to disc, this is very difficult and something you need a great deal of skill to do and as it involves breaking software protection, I cannot tell you how to start going about it.

There are some commercial programs and roms to do this (Watford have some) but they will not work on all programs.

A disc does not have a baud rate as such. It takes 8μS to read a byte from disc but that is once the head has located a track and found the correct sector. As a rough guide Elite loads in about 3 seconds.

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A hard disc is no longer a luxury

JIM NOTMAN tries out the Viglen 28Mb hard disc

I LAST looked at a hard disc system in the May 1986 issue of *The Micro User* and even in that short time there have been numerous changes in that particular hardware scene.

Hard discs have two big advantages over floppy discs, the first being a large capacity in a relatively small space. A hard disc may write 600 tracks of information in the space that a floppy disc can write 80. In addition there is an increased number of sectors on each track.

The other main advantage is the high speed of access and data transfer. On the debit side, the total price of the units is higher than a floppy system. But if you look at the cost of each byte of storage this works out lower for hard discs and the current trend is for these costs to continue to fall.

Users are now demanding more and more storage directly connected to their computers. Last year many would have been satisfied with a 5 or 10Mb disc, but now they want at least 20Mb.

Viglen produces a range of Winchester hard discs with capacities ranging from 20Mb up to 56Mb. The version reviewed here has 28Mb of storage capacity, equivalent to about 70 DFS floppies (80 track double sided) or 45 ADFS floppies.

The discs in a Winchester are fixed into the unit and cannot be removed like those in a floppy disc drive.

They are housed in a cream coloured metal case, about the size of a floppy disc unit and standing just under 10cm high.

The front has a black plastic panel with a red activity light visible. On the back panel there is a single control, a mains power switch, next to the power in socket.

The unit is connected to the 1MHz bus of the BBC Micro by about one metre of ribbon cable. There is also a 1MHz bus outlet socket on the back panel, allowing another 1MHz device to be plugged in.

Several such devices can be daisy-chained if they also have outlet sockets – for the purpose of this review I connected a Music 500 and an Acorn Teletext Adapter.

There are two other sockets on the back panel for connecting a second hard disc unit. This is an easy way of adding more storage capacity or of being able to backup data from one disc to another.

After switching on, the disc drive starts to spin, sounding rather like an aircraft taking off in the distance, as the cooling fan comes on and the discs accelerate up to full speed.

Unlike floppy disc drives, the hard discs continue to spin all the time they are switched on. In a quiet environment this noise can seem rather intrusive, but in office or school environments you will hardly notice it.

The hard disc is controlled by the Acorn Advanced Disc Filing System, supplied as standard in the BBC Master, and can be added to a Model B+ by plugging in an additional eprom.

If you have a Model B, the ADFS is required, but if you also want to be able to read and write to ADFS floppy discs you will have to fit a 1770 disc interface as well.

A set of Winchester utilities is supplied, which includes a formatter if the whole disc needs to be reformatted. Using the command *FREE,

→

From Page 93

a staggering total of 29,565,952 bytes of storage is revealed.

The most useful utility supplied is the ADFS menu program helping you handle the vast amount of storage memory available. Due to the size of the program and its screen memory requirements it will not run on a micro which does not have either shadow screen ram or a 6502 second processor fitted.

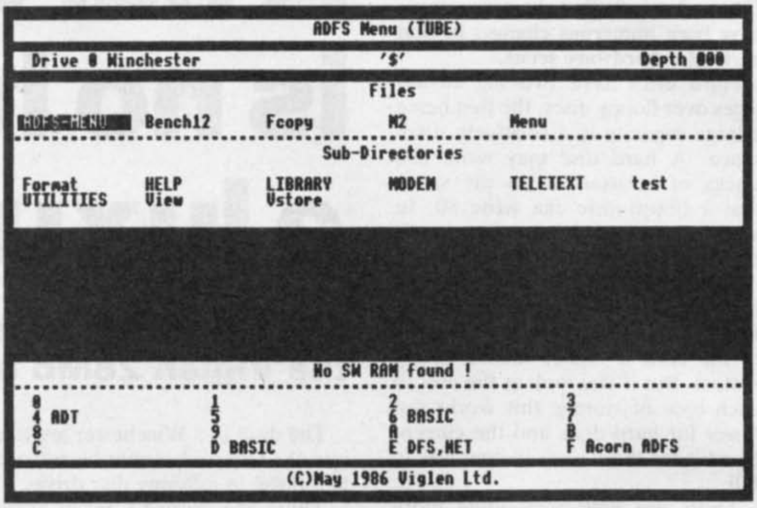
The menu program divides the screen into different windows, as can be seen from Figure I. The upper window displays files from the current directory which can be selected using the cursor keys. Basic files will be CHAINed, machine code files *RUN and sideways ram images *LOADed.

In the centre of the screen any sub-directories from the current screen will be displayed. If one is selected, its files and any further sub-directories will be shown allowing you to quickly look through the disc for the file you want.

In the lower part of the screen the titles of roms and any sideways ram and their socket numbers are shown.

An expected problem was that it might be difficult to transfer some disc packages from floppy disc if they used software protection, but this is true for any hard disc system, even Acorn's.

I do use other computers apart from the BBC Micro and I have often been disappointed by the speed at which they handle their hard discs, but this system is no slouch.



```
                         ADFS Menu (TUBE)
 Drive 0 Winchester             '$'                      Depth 000
                              Files
 ADFS-MENU   Bench12     Fcopy       M2          Menu
 ****************************************************************
                          Sub-Directories
 Format      HELP        LIBRARY     MODEM       TELETEXT    test
 UTILITIES   View        Vstore



                         No SW RAM found !
 ****************************************************************
 0                1                2                3
 4 ADT            5                6 BASIC          7
 8                9                A                B
 C                D BASIC          E DFS,NET        F Acorn ADFS
                      (C)May 1986 Viglen Ltd.
```

Figure I: The ADFS menu

The dramatic increase in speed over a floppy system is reflected in the benchmarks shown in Table I. The biggest improvements are with relative access files, the type commonly used with databases.

There were no software or hardware problems with any program which also ran with the ADFS on floppy discs. I was particularly interested to see if there were any problems associated with the 1MHz bus.

The only one encountered was not related to the hard disc but to the Teletext Filing System supplied with the Acorn Teletext adapter which does not seem to like the ADFS. There was no problem with the BBC Advanced Teletext System.

DFS Benchmark Table

Acorn ADFS with a model B

		Floppy	Hard
1	OPEN + CLOSE files*1000	21.7	21.9
2a	PRINT 1000 numbers	13.3	3.9
2b	PRINT 100 strings	46.4	12.5
3a	INPUT 1000 numbers	6.2	3.3
3b	INPUT 100 strings	23.2	11.3
4	BPUT 1000 bytes	8.0	2.1
5	BGET 1000 bytes	3.4	1.5
6	Move PTR 1000 places	6.8	5.5
7a	Write test relative file	48.6	13.9
7b	Read test relative file	23.8	11.7
8a	Write relative file backwards	69.2	15.3
8b	Read relative file backwards	22.6	12.0

Table I: DFS Benchmark Table

The BBC Master reference manual part one is supplied with the hard disc, along with an 18 page Viglen Winchester user guide giving basic information about the system and details of the programs supplied.

The Viglen systems are cheaper than Acorn's and the large amount of fast storage on line will improve any disc intensive task on a BBC system, such as software development using compilers, running a large database, using a spelling checker program, or downloading programs from Teletext or via a modem.

I would not consider running an Econet system or a Bulletin Board without a hard disc.

A final word: For serious computing a hard disc is no longer a luxury but a necessity and I will be loath to hand the unit back after this review. ■

Product: 28Mb hard disc
Price: £799
Supplier: Viglen, Unit 7, Trumpers Way, Hanwell, London W7 2QA.
Tel: 01-843 9903

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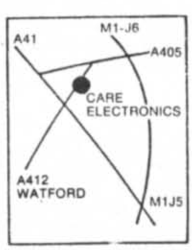

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(c) £1.50
(d) £1.00

DISC DRIVES

Full details on page 6.

All drives fitted with MITSUBISHI mechanisms.

5.25″ Single Drives 40/80 switchable:

TS400 400K/640K	**£114 (b)**
PS400 400K/640K with integral mains power supply	**£129 (b)**

5.25″ Dual Drives 40/80 switchable:

TD800 800K/128OK	**£226 (a)**
PD800 800K/1280K with integral mains power supply	**£229 (a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£249 (a)**

3.5″ 80T DS Drives:

TS351 single 400K/640K	**£99 (b)**
PS351 single 400K/640K with integral mains power supply	**£119 (b)**
TD352 Dual 800K/1280K	**£170 (b)**
PD352 Dual 800K/1280K with integral mains power supply	**£187 (b)**
PD853 Combo Dual 5.25″/3.5″ drive with psu.	**£229 (a)**

DISC DRIVE MULTIPLEXER

Full specification on page 6.

TDM2 Dual Unit: 2 computers/one drive unit	**£75 (b)**
TDM4 Quad Unit: 4 computers/one drive unit	**£135 (b)**

3M FLOPPY DISCS

5.25″ Discs in packs of 10

744 40T SS DD	**£10.00 (d)**
745 40T DS DD	**£12.00 (d)**
746 80T SS DD	**£14.50 (d)**
747 80T DS DD	**£16.00 (d)**

See page 10 for details of Special Offer

(Add £1 for library case packing)

3.5″ Discs in packs of 10

80T SS DD	**£20 (d)**
80T DS DD	**£25 (d)**

BULK DISCS

High quality unlabelled discs supplied in packs of 50 in a storage box. The 5.25″ discs have the reinforcing hub rings. These discs are guaranteed for life.

50 5.25″ 40 T single sided discs in lockable box.	**£35 (b)**
50 5.25″ 80T double sided discs in lockable box.	**£45 (b)**
50 3.5″ 80T double sided discs in lockable box.	**£95 (b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25″ Kit with 20 disposable discs	**£12.50 (d)**
3.5″ Kit with 20 disposable discs	**£14.00 (d)**

DISC STORAGE BOXES

DB530 Non Lockable 30 x 5.25″	**£6.00 (c)**
DB340 Lockable 40 x 3.5″	**£8.50 (c)**
DB550 Lockable 50 x 5.25″	**£9.00 (c)**
DB570 Lockable 70 x 5.25″	**£11.00 (c)**
DB5100 Lockable 100 x 5.25″	**£13.00 (c)**

MONITORS

BBC lead incl with all monitors

MICROVITEC 14″ RGB Monitors

Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	**£179 (a)**
Microvitec 1431AP As 1431 + composite video and sound input	**£199 (a)**
Microvitec 1451 Medium Resolution 653 pixels	**£225 (a)**
Microvitec 1451AP As 1451 + composite video and sound input	**£259 (a)**
Microvitec 1441 High Resolution 895 pixels	**£365 (a)**

Microvitec 20″ RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	**£380 (a)**
Microvitec 2040CS High Resolution RGB/Comp Video	**£685 (a)**
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	**£219 (b)**
PHILIPS 8501 See page 10 for details.	**£139 (a)**
TAXAN SUPER VISION II 12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	**£249 (a)**
TAXAN SUPER VISION III 12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	**£289 (a)**
MITSUBISHI XC1404 14″ Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	**£219 (a)**

12″ MONOCHROME MONITORS

TAXAN KX1201G Hi Res green etched screen	**£90 (a)**
TAXAN KX1202G Hi Res Long Persistence (P39)	**£95 (a)**
TAXAN KX1203A Hi Res amber etched screen	**£95 (a)**
PHILIPS BM 7502 Hi Res green screen	**£75 (a)**
PHILIPS BM7522 Hi Res amber screen	**£79 (a)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	**£20 (c)**
Philips Swivel Base	**£14 (c)**
Monitor Stand Models B & B +	**£10 (c)**
Monitor Stand Master	**£13 (c)**
Double Tier stand Models B, B + or Master	**£24 (b)**
Taxan RGB Lead	**£5 (d)**
Microvitec Lead	**£3.50 (d)**
Monochrome BNC/Phono Lead	**£3.50 (d)**

EPROMS/RAMS

2764-25	**£2 (d)**
27128-25	**£2.50 (d)**
6264LP-15	**£3.40 (d)**

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	**£37 (c)**
ATPL Battery backup kit	**£16 (d)**
ATPL Board for BBC+ (now in stock).	**£31 (c)**
TIME WARP Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	**£31 (d)**
Time Warp with PANOS Utilities.	**£39 (d)**

MODEMS

(All modems are BABT approved)

See page 7 for modem specifications

MIRACLE WS2000V21/23 & BELL stds	**£95 (c)**
WS2000 Auto Dial Card	**£27 (d)**
WS2000 Auto Answer Card	**£27 (d)**
WS2000 SK1 Kit	**£5 (d)**
WS2000 DS1 disc	**£10 (d)**
WS2000 Data Cable for BBC	**£6 (d)**
MIRACLE WS4000 V21/23	**£149 (b)**
MIRACLE WS3000 V21/23	**£295 (b)**
MIRACLE WS3000 V22	**£495 (b)**
MIRACLE WS3000 V22 bis	**£650 (b)**
WS3022 1200/1200 fd	**£395 (b)**
WS3024 2400/2400 fd	**£570 (b)**
BBC Data Cable for WS3000/4000	**£7 (d)**

PROGRAMMING ACCESSORIES/SOFTWARE

See page 8 for detailed specification

Compatible with B, B+ and Master

EPROMER II while stocks last.	**£69 (b)**
EPROMER III See page 8 for details.	**Approx £119 (b)**
MPROMER	**£49 (c)**
META ASSEMBLER	**£145 (b)**
PORTAL EPROM EMULATOR 128K	**£185 (b)**
PORTAL EPROM EMULATOR 512K	**£285 (b)**
TEAM Disassembler	**£145 (b)**
EPROM ERASERS **UV1B** 6 eproms, safety cutout	**£47 (b)**
UV1T 6 eproms, timer, safety cutout	**£59 (b)**

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ESTABLISHED OVER 15 YEARS

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305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B+ MASTER & Compact. (See page 9 for specification)	
BASIC Version	£59 (d)
Tracker Ball/Mouse Version (TM)	£71 (d)
TM Version plus Tracker Ball	£105 (c)
TM Version plus Mouse	£90 (c)
Plotter Driver Generator	£21 (d)
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
Super Art	£43 (d)
PAGEMAKER	£39 (d)
MAX	£17.35 (d)
3D ZICON	£21 (d)
PAINTPOT	£21 (d)
DATABASE	£21 (d)
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb	£37 (d)
STARdataBASE A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW.	£49 (d)
MASTERFILE II Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T)	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0	£56 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper.	£9 (d)
DOT PRINT PLUS Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP.	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS See page 4 for details.	£19 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
WORDEASE A 16K rom based utility for WW+	£24 (d)
SPELLCHECK III A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc.	£31 (d)
EDWORD II (Please specify model B, B+, Compact or Master).	£43 (c)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor.	£37 (d)
WINDOMATIC See page 9 for details.	£15 (d)
VIEWPLOT A disc based plotting program. (To be released soon).	£22 (d)
INTERSHEET The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc.	£39 (d)
INTERCHART Graphics package for Intersheet	£27 (d)
ULTRACALC BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc.	£52 (d)
QUICKCALC A disc based economically priced spreadsheet package (40 or 80T Disc).	£14.50(d)
MINI OFFICE II (for BBC B) A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T)	£14.75(d)
MINI OFFICE II (Rom)	£48 (d)

LANGUAGES

META ASSEMBLER Multi processor Assembler full details on page 8	
TEAM DISASSEMBLER	£145 (b)
MACROM A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory.	£33 (d)
ACORN MICRO PROLOG Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly.	£62 (d)
ISO-PASCAL Acorn's full implementation of International Std Pascal on 2x16K roms.	£48 (c)
ISO PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL A fast P-code compiler and stand alone utility (40 or 80T).	£36 (d)
BCPL	£46 (c)
BCPL CALCULATIONS Supports floating point, fixed point and fast integer calculations on BCPL	£17.50 (d)
BCPL STAND ALONE GENERATOR	£39 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT A frame based authoring system from NPL for interactive computer tutoring. Disc based	£52 (c)
MICROTEXT PLUS Extended Features incl extra memory, control of external devices etc. Rom based.	£229 (b)

COMMUNICATIONS

TERMULATOR Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations.	£25 (d)
COMMSTAR A highly popular communication rom suitable for all general purpose applications (specify B or Master)	£28 (d)
COMMUNICATOR A full 80 col VT100 emulation program with easy to follow screen menus.	£49 (d)
DATABEEB A variety of facilities for use with WS2000 Modem	£26 (d)

COMPACT
(all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£22 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d;
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual	£9.50 (d)
Cassette	£9 (d)
EXMON II	£23 (d)
HELP II	£25 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£22 (d)
PRINTMASTER	£24 (d)
DUMPMASTER supports about 40 printers	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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(24 hr viewdata system)
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Orders welcome from government depts & educational establishments.

All prices ex VAT. Prices are subject to change without notice.

Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY:
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

PICTURE CRAFT
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

MATHS WITH A STORY 1
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

MATHS WITH A STORY 2
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

NUMBER GAMES:
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

USING YOUR COMPUTER
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres.
Prog Cass £10 (d)
Audio Cass £5 (d)
Book £8 (d)

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform acceln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

VU-TYPE
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

GENERAL

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II **Disc £16 (d)**
(Specify it for Master).

BATTLEFIELDS **Cass £8.50 (d)**

A VOUS LA FRANCE
A home study aid for anyone learning French.
Cass/EC £17 (d)
Book £5.25 (d)

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation.
Disc/aud/EC £16 (c)
Book £5.95 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£28 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£27 (c)
LX80 Tractor Feed	£20 (d)
LQ800	£44 (b)
LQ1000 Tractor Feed	£49 (b)
EX800/1000 Colour option	£55 (b)

SHEET FEEDERS:

8338 LX80	£49 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
8330 RX80 +	£129 (b)
LQ800	£129 (b)
LQ1000	£159 (b)
EX800	£129 (b)
EX 1000	£289 (b)

Ribbons:

RX/FX100/100 + . FX105	£7 (d)
RX/FX80/80 + , FX85	£4 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	**£7.50 (d)**
KP910	£7 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)

TAXAN CANON Accessories:

RS232 + 2K buffer	£78 (d)
Ribbon	£6 (d)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£149 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£189 (a)

BROTHER HR20

Daisy Wheel	£18 (d)
Tractor Feed	£116 (a)
Ribbon (Carbon/Nylon)	£3.00 (d)
Sheet Feeder	£239 (d)

Printer Leads:

BBC Parallel Lead (1.2m)	£10 (d)
BBC Serial Lead (1.2m)	£6 (d)

Other lengths can be supplied on order:

IBM Parallel Lead (2m)	£12 (d)

PAPER & LABELS

Plain Fanfold paper with micro perforations:

2000 sheets 9½" × 11"	£13 (b)
2000 sheets 14½" × 11"	£18.50 (£4.50)

Labels/1000:

Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

BBC SPARE PARTS

All Prices are Retail ex-VAT carriage code (a).

BBC & Misc:

Keyboards	£52 (b)
Powers Supply	£52 (b)
Keyswitch	£1.75
Video ULA	£18
Serial ULA	£14
DNFS	£18
UHF MOD	£4.50
6502A CPU	£6.50
65CO2 CPU	£12
6522 VIA	£3.50
6522A VIA	£5.50
LM324	£0.45
74ALS 245	£5
88LS120	£3.00
SAA5050	£9.00
6845SP	£6.50
UPD7002	£5.00
DS3691	£3.50
7438	£0.40
74LS00	£0.24
74LS04	£0.24
74LS10	£0.24
74LS123	£0.80
74LS163	£0.75
74LS244	£0.80
74LS245	£1.10
74LS373	£0.90
74LS393	£1.00

BBC PLUS:

PAL16REN	£13.50
64K × 4 DRAM	£8.50
6512A	£12.50

BBC MASTER:

1-Mbit ROM	£39
MSI CHROMA IC	£13.50
65SC12P-2	£12.50

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ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

- NS32016 8MHz Main Processor & 32081 FP processor.
- 20 Mbyte Winchester and one 80T Ds floppy drive.
- A detachable keyboard Hi Res RGB Monitor.
- 4Mbyte of on board Ram as standard.
- Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
- Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
- **Phone for detailed leaflet.**

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to the BBC Computer.

- Interfaces with the BBC through the tube connector.
- NS32016 6MHz CPU & 32081 FP processor.
- 1Mbyte Ram as standard.
- Packaged software includes all the languages and utilities supplied with the ACW Work Station.
- **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (non-Acorn) for the Co Processor for 10Mhz operation to enable faster processing. It can be fitted at no extra charge if ordered with the Co Processor.

TIME WARP Real Time Clock with PANOS utility allows screen display of time, day and date within PANOS at anytime and allows these data to be printed on documents. Model B users will find this particularly useful.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

- 10 Mhz 80186 *DOS PLUS.
- GEM Write & GEM Draw.
- 'WIMP' Environment with high quality Mouse.
- Runs many 'IBM' programs — even 'Flight Simulator'!
- Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

- Built-in character font generator.
- Built-in view printer driver.
- Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- True bold print as well as double width.
- 12 character pitch as standard.
- Fully variable pitch and line spacing.
- Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
- **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
- **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

```
homes of a ruling class whose right to
rule was based on the ownership of
land.  Large estates produced money;
perhaps even more important, they
supplied people to fight for their
```

NORMALLY JUSTIFIED TEXT

```
homes of a ruling class whose right to
rule   was   based   on   the ownership of
land.   Large estates   produced   money;
perhaps    even  more   important,   they
supplied people   to   fight   for   their
```

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

THE BBC
MASTER SERIES
MICROCOMPUTER

For price details see page 1.

Compact
BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

THE FAMILY COMPUTER

Now available from stock

This low cost high tech computer has developed specially as a computer for home use.

SPECIFICATION

128K RAM, ADFS Filing system, BBC Basic version 4, MASTER style keyboard, a single 640K 3.5" double sided drive. RGB/Mono Monitor as an optional extra.

Bundled software pack includes:
Desk Top Prog with note pad & calculator, VIEW 3.0, Card Index, & LOGOTRON. A set of exciting games and graphic demos.

EPSON PRINTERS

EPSON have launched a new series of printers to update the FX range — world's best selling printer range. The new FX800 and FX1000 range combines printing versatility and superior technical features with the highest standards of reliability. The features include two NLQ fonts, 10, 12, 17 and 20 cpi, dble ht and dble width, 200 cps in draft and 40 cps NLQ, tractor and friction as standard, IBM compatible, full graphics, 8K buffer, Parallel interface.

EPSON EX800/1000 range offers high speed printing to offer versatility in volume printing with speeds of 300 cps in 12 cpi mode. Four colour printing option is available for these printers.

EPSON LQ800/1000 range with its 24 pin print head offers the highest standards in letter quality printing at high speeds while maintaining the versatility of dot matrix printers. The hex density graphics capability produces about the best printout any dot matrix printer can produce.

STAR Power Type

A low cost high quality daisy wheel printer with 165 col, 180 cps. Parallel and Serial Interface as standard, reverse paper feed, left/right margin set and large variety of optional fonts.

STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cps offers novel and innovative features. There are no dip switches to set, full control from the front console. Plug in interface cartridge simplifies adaptation to different computers. Friction & Tractor feed as standards. Epson Compatible Graphics.

NATIONAL PANASONIC KX P1080

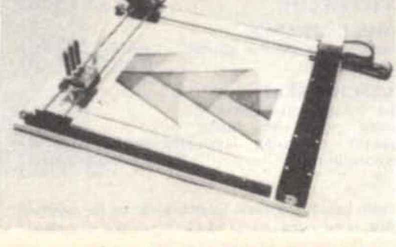
A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson Compatible Graphics.

HITACHI 672

- A3 four colour precision plotter.
- Serial and parallel ports as standard.
- Produces 'OHP' transparencies as well as plain paper.
- 'HP' graphics language or single character commands.

GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

All accessories available separately if required.

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(24 hr viewdata system)
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(d) £1.00

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

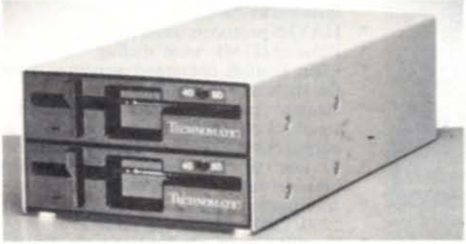
*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

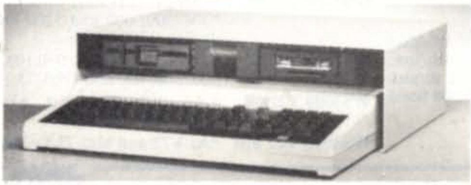
*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

*PD853 Combo drive includes a combination of 5¼" (40/80T switchable) and a 3½" 80 Track Double Sided mechanisms. Complete with mains p.s.u. Ideal for software conversion for 5¼" to 3½" or vice versa.

TS 400


PD 800

PD 800 P


P2041 HT

WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

- P20HD Stand alone.
- P204HP With a single floppy housed in a plinth version case.
- P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
- TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

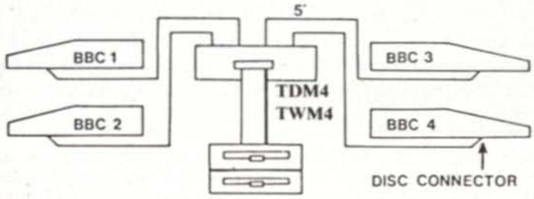
ALL TECHNOMATIC DRIVES NOW CARRY A TWO YEAR WARRANTY

FLOPPICLENE
Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4/TWM4 Quad Unit (up to 4 computers)
TDM2/TWM2 Dual Unit (2 computers)

WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highly popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data between the computers. (Not recommended for use with randon access files).

LEADING SUPPLIER TO BBC MARKET
ESTABLISHED OVER 15 YEARS

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE

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MODEMS

MIRACLE WS4000

- A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- Plain English commands make it simple to use, even for the first time user.
- Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- Equalisation model in V23 for line-noise filtering.
- Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

- A comprehensive manually switched 'World Standard' modem.
- Competitively price with a capability to be upgraded for various options.
- BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).

- SK1 chip set for computer control.
- User port cable.
- Auto dial Board.
- Auto Answer Board.
- DS1 disc for auto dial facilities on Commstar.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.
MODEM V22bis
MODEM V22
MODEM V21 23

WS 3000 Range

Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.

Please see page 2 for prices

MIRACLE WS3000 RANGE

- A professional range of intelligent modems with full BABT approval.
- Auto Answer and Auto Dial facilities installed as standard.
- HAYES protocols implemented.
- Pulse or DTMF 'tone' dialing.
- Plain English command structure simplifies the use of the modem.
- Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- A line sharing facility to differential between data and voice calls.
- Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- Equalisation mode for line noise filtering.
- Internal battery back up for storing 63 names, numbers and default settings.
- Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

includes a FREE Pocket Wordstar package

- Multiform Z80 will run most CP/M 2.2 formats on the BBC.
- 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
- 8271 allows single density CP/M formats whilst 1770 DFS allows both single and double density CP/M formats. Single or dual drive, 40 or 80 track format and SS or DS drives can be used providing the CP/M format matches.
- Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

WYSIWYG PLUS

NEW

This new screen/printer utility not only allows you to see on the screen exactly how the text is going to appear on the paper when printed but also simplifies the printer control codes that you need to use to get the different effects.

WYSIWYG+ can be used in BASIC or from within the popular word processor WORDWISE plus.

The printer commands have been simplified to meaningful words so that the user does not have to either remember or keep referring to the printer manual and try to decode the commands to VDU format. For example: *ENGLARGED will display enlarged text on the screen and send the appropriate command to the printer to print in enlarged mode.

Some of the features you could see in WW+ or from BASIC include:
*SUBSCRIPT, *SUPERSCRIPT, *ENLARGED, *BOLD, *EMPHASISED, *CONDENSED (up to 132 characters on screen), *PICA, *ELITE, *GRAPHICS (design your own logos and symbols), *UK, *FRENCH, *US, *TELETEXT (character sets), *BACKSPACE (for overprinting), *DOWNLOAD (new characters or fonts).

Simply plug in the WYSIWYG+ rom in your computer and utilise the features built in to your printer with ease and least bother to produce the results you know are possible but not so simple to achieve. No other single package offers this much flexibility and simplicity to get the best from your printer.

WYSIWYG+ rom is supplied with a comprehensive manual.

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EPROMER III Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.

The single rail eproms handled by the EPROMER III are:

●2716 2732 2764 27128 27256 27512 27513 27011
2516 2532 2564 (NMOS & CMOS)
●One time eproms P27XXX, 87CXXX etc.
●Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike.

The main features of the programming software are:

- Device, function and voltage selection from the computer keyboard.
- Continuous display of the options selected.
- All eproms upto 27512 (64K) programmed in single pass.
- Automatic Intelligent identifier support for eproms able to respond.
- Selectable programming voltage 25/21/12.5V
- 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
- Serial port protocols supported.
- Intel HEX, Motorola S, HEX and ASCII protocols supported.
- DFS, NFS, ADFS and Rom Filing System Supported.
- BASIC/Machine Code programming using RFS.
- Powerful editor with input in HEX or ASCII.
- Full editable 64K file.
- Block move of data within the address range.
- User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- Multiple loading for ROM Filing System

EPROMER III interfaces with the BBC through the 1 MHz bus, has a mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 128 (2716, 2732, 2764, 27128):
PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

MICROPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micropromer program the device.

- * Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
- * Comprehensive error reporting and checking.
- * Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
- * Support for DFS, ADFS and cassette filing systems.
- * Edit data in Hex or ASCII.
- * Total control via software, no switches to worry about.
- * Supplied with user manual and software on diskette.
- * MPROMER simply plugs into the EPROMER II ZIF socket.

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc): updates soon for most of Meta processors.

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

BOOKS

No VAT Carriage Code (c)

LANGUAGES

6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPL User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45

BBC MICRO GUIDE BOOKS

BBC User Guide Acorn	£15.00
BBC Plus User Guide	£15.00
Drawing your Own BBC Programs	£6.95
Inside Information	£8.95
Math Prog in BBC Basic	£7.95
Toolbox 2	£10.95
VIA 6522 Book	£4.50

PROGRAMMING/UTILITY

Advanced Sidewise Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Advanced User Guide	£12.50
Applied Ass./Lang on the BBC	£9.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC ROM	£9.95
Beginners Guide to W.P	£7.95
View 3.0 User Guide	£10.00
Viewstore	£10.00
Viewsheet	£10.00
Wordwise Plus	£9.95

SOUND & GRAPHICS:

Mastering Music	£6.95

DISC DRIVE SYSTEMS:

Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA

APPLICATIONS:

Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75

PROFESSIONAL SOFTWARE

Wordstar made easy	£16.95
Introduction to Wordstar	£17.95
Wordstar Handbook	£11.95
dBase-II for the first time user	£16.95
Understanding dBase-III	£22.95
Multiplan Made Easy	£18.95
Multimate Complete Guide	£16.95
ABC of LOTUS 123	£17.45
1-2-3 for Business	£16.95
Adv Tech in dBase II/III	£22.95
Mastering CP/M	£17.95
CP/M Bible	£16.50
Introducing CP/M on BBC & Z80	£9.95
MS/PC DOS Prompt	£10.95

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NOVACAD

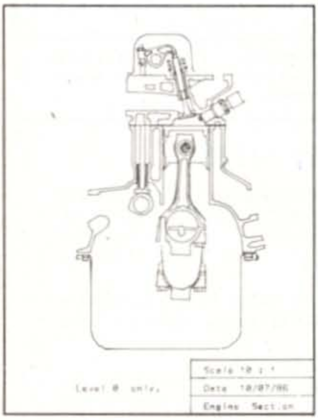
Computer Aided Draughting for the BBC Micro

“The Novacad system is a thoughtfully designed piece of software requiring a minimum of manual bashing so that real results are possible with just a few hours work.”

“Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, “the best on the market”.” **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.



MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

The major features of NOVACAD are:

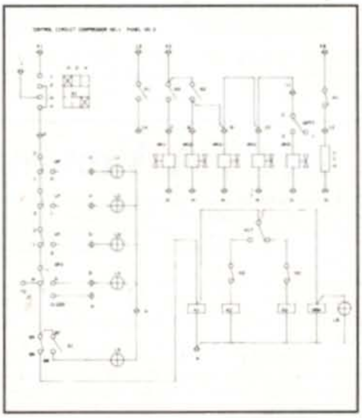
- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique facility to output to any BBC compatible plotter.

NOVACAD

is available in two versions

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard. Tracker Ball or a Mouse.



OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

NEW

WINDOMATIC

NEW

All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in upto 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of recitifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.
The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.
The program is compatible with BBC Master, B+ and 6502 and Turbo second processors. It can be entered from VIEWSHEET by use of function keys or it may be run by loading a previously saved window configuration from disc.
The program is supplied on a disc with a comprehensive manual.

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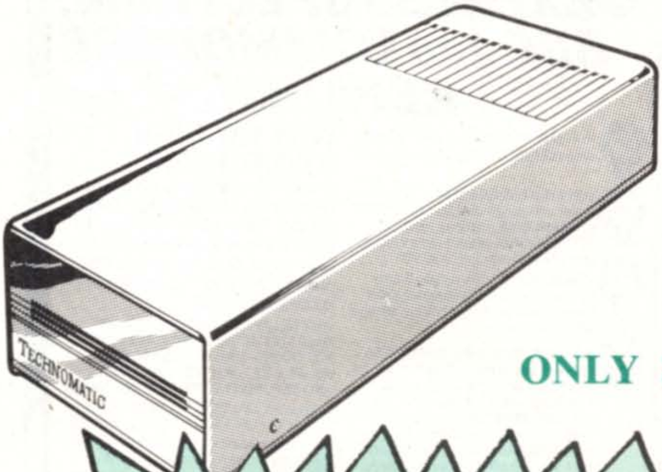

20 Mbyte Winchester

- Cased with power supply and cooling fan.
- 1MHz bus extension connector.
- Fully compatible with Acorn ADFS and FS III.
- 12 months warranty

ONLY £499 (a)

SPECIAL OFFERS PAGE

3M FLOPPY DISCS

Individually Tested and Guaranteed for Life

Ever mindful of the catastrophies caused by data loss, 3M make floppy disks that are at least 32% less abrasive than the industry average. Which is why after stringent analogue and digital tests each 3M floppy disk is guaranteed error free for life.

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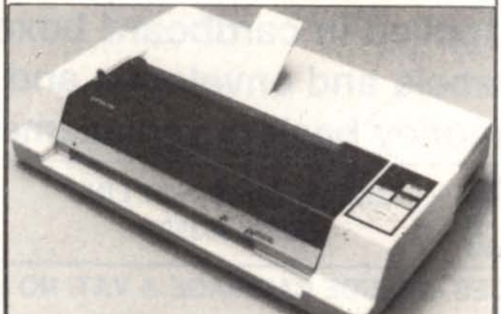

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Putting things in perspective

In Part 10 of his series on spreadsheets NIGEL PETERS sets up guidelines for comparing programs

LAST month saw us reaching the end of our examination of the Mini Office II spreadsheet. When you think that it took us some nine months to cover all its features, you'll see just how powerful it is. Hopefully you'll have also have seen how easy it is to use.

Yet although it took us so long to deal with in detail, the Mini Office II spreadsheet is a relatively simple package compared to some others that are available.

What it does it does well (in fact for the price it's remarkable) but others do a lot, lot more. Yet however complicated they are, they build on the basic framework we've covered in looking at the Mini Office II spreadsheet.

For the next few articles we'll be looking at some of these spreadsheets, but for the present, let's look at what we've learnt and put it in perspective. This will give us a basis for examining the facilities available with other packages.

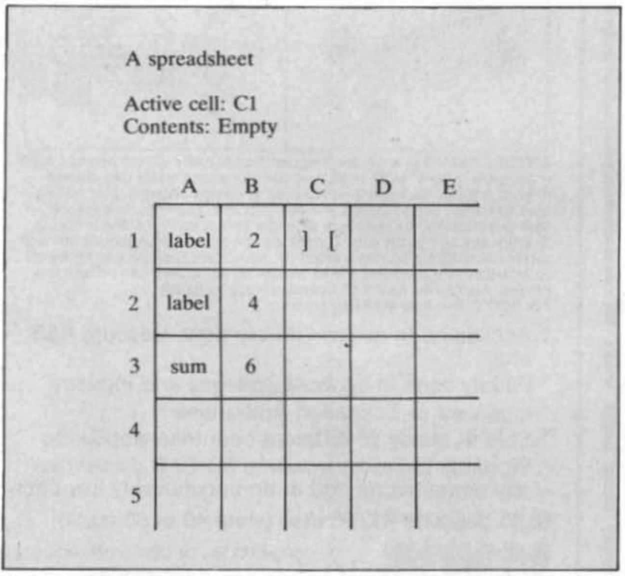
At its simplest, a spreadsheet can be looked on as a set of rows and columns. The rows are numbered from 1 to some limit such as 20, so each row can be picked out by a unique number. The columns are identified by a letter ranging from A to whatever that particular spreadsheet will allow.

Figure I shows the layout of a typical spreadsheet, though it doesn't show all the rows and columns the spreadsheet contains. Instead it just illustrates a small group of them, columns A to E, rows 1 to 5.

This corresponds to what we see when we use a spreadsheet program. The spreadsheet itself is usually so large that not all of it can fit on the screen at once. The result is that we only see a part of it at a time.

We can look on the screen as a window, through which we can view only a small section of the whole grid. Almost invariably a spreadsheet has its top lefthand corner showing on the screen when it starts.

Should you want to see the other parts of the sheet, you just move the window across the spreadsheet (or the spreadsheet under the window if you like). This is usually done using the cursor keys – the arrowed keys to the right of the keyboard.



A spreadsheet

Active cell: C1
Contents: Empty

	A	B	C	D	E
1	label	2	] [		
2	label	4			
3	sum	6			
4					
5					

Figure I: A typical spreadsheet

How large the window is and which particular keys control it depends on the spreadsheet used and the dimensions of the rows and columns.

Just as cells are the basic building blocks of living matter, so cells are the building blocks of spreadsheets. However, these cells are rather different, being parts of the spreadsheet formed by the intersection of the columns and rows.

The column letters and row numbers are used in combination to name a particular cell, rather like using a map reference.

Looking at Figure I we find cell B2 by seeing where column B and row 2 intersect. This cell is known as B2 (you'll see that the name is unique) and in the diagram it contains 4.

Leaving the grid for the moment, look at the area above the window. Here lies the status area which, unsurprisingly, gives you information about the state of the spreadsheet, or more particularly about one cell of the spreadsheet – the active cell.

Spreadsheet programs only allow you to alter one cell at a time (though this may have effects on other cells as we'll see later). The active cell is the cell you are working with at any particular time. It's the one that you're actively doing something to.

You decide which cell is the active cell by moving the cursor to it. Nor-

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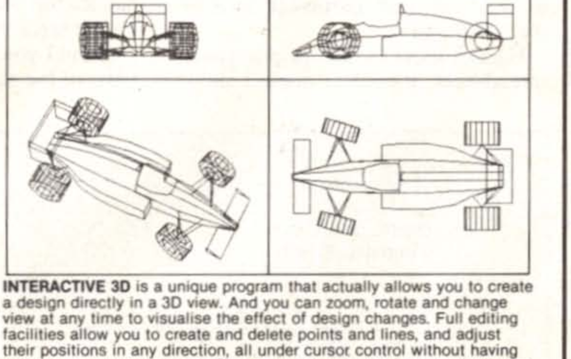

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From Page 107

mally at the start of a new spreadsheet all the cells are empty and the cursor is at the top left in cell A1. So at the start, A1 is active.

This can be changed by moving the cursor over the sheet, usually under control of the cursor keys.

As the cursor roams across the grid the status area gives details of each active cell in turn. These details usually tell you which cell is active (to save you hunting for the row and column identifiers) and its contents.

In Figure I the cursor (represented by the square brackets) is in cell C1 making that active. The status area gives the details of this, showing that it's empty. Notice that the cursor doesn't have to be the flashing line of Mini Office II in Mode 7.

From Mini Office II you should remember that there are three things that can go into a cell; numbers, labels and formulae.

The numbers – which are the raw data of the spreadsheet – are no problem, we just type them in at the keyboard, press Return and they enter the active cell. It's the same with labels such as VAT or PRICE.

However, when we want to enter a formula we have to first warn the Mini Office II spreadsheet by pressing *f0*, one of the red function keys at the top of the keyboard.

Consider Figure I. To get "label" into cells A1 and A2 we just enter "label" and press Return. To get the figures into cells B1 and B2 we simply make B1 active, enter 2 (with Return) and then make B2 active and put in 4.

To get the program to add B1 and B2 together and put the results in B3, we move the cursor to B3, making it active, press *f0* to warn that a formula is coming and then enter B1+B2.

What then appears in B3 is the result of applying the formula to the values held in B1 and B2. Notice that it's a number resulting from the formula that appears, not the formula itself.

The formula used to generate that number usually appears in the status area. If we forgot to press the *f0* key the program would just take B1+B2 as a label and put that into B3. Very frustrating.

‘. . . command lines can get quite complicated as the packages get more sophisticated – and more expensive’

All spreadsheets work with number data and formulae, but they don't always do it in the same way. While most will accept numbers happily, some have to be told that a label is a label.

Cleverer programs, like Mini Office II, can figure out the difference automatically: Even cleverer programs don't have to be told that you're entering a formula.

If you type something in that's not a simple figure, the program will treat it as a formula and try to work it out. If the result is silly (how do you calculate "VAT", for instance?) then it knows that it's dealing with a label, otherwise it assumes a formula.

It's these formulae that give the spreadsheet its power, linking together raw data, producing results and going on to produce other results from combinations of these and yet more formulae.

In addition to creating basic spreadsheets – like the ones we've covered so far – most such programs allow you lots of other commands.

Roughly, these fall into two categories. There are those that control what the spreadsheet actually does and those that control what it looks like when it's done it.

With Mini Office II most of the commands that deal with what the program does are achieved using the function keys.

We can have automatic recalculation – the ripple effect that occurs when we change a data value – or not as we wish. We can lock cells so we can't change them inadvertently or set them all to zero at the touch of a function key.

The commands that affect the layout of the screen tend to come from menu choices. We can add rows and columns, decide on the number of decimal points displayed and on the justification used in the cells by selecting our choice from a list of options.

Either way you can see that as well as tools to establish the spreadsheet itself, the program has others to help adjust it to our needs. Mini Office II is quite advanced in how it does this, its combination of function keys and menus being a joy compared with some other spreadsheets.

These spreadsheets require you to type in a command at the keyboard. So if you wanted to zero all the boxes you'd enter Z (for Zero) and press Return. Well, not quite.

First of all you'd have to tell the micro that it's a command and not a label with a sign such as /. So whereas with Mini Office II we've mostly used the letter and number keys to enter data, labels and formulae, with other spreadsheets they're used to enter commands.

As we'll see, these command lines can get quite complicated as the packages get more sophisticated – and more expensive.

One area where the more sophisticated packages do score over the Mini Office II spreadsheet is in the number of functions they allow. With the disc-based version you can only do such things as find the maximum or minimum of a set of values or total them.

However, there is a host of other functions that various spreadsheets use. These include the trigonometric functions SIN, COS and TAN, functions to find the maximum and minimum values over an area of cells, LOG and constants such as PI.

There are even logical operators which can be used to allow the spreadsheet to make a choice.

● *These all combine to allow much more sophisticated spreadsheet modelling. But more on that next month as we look at BBC Soft's spreadsheet Ultracalc.*

File date stamper

Give your Master the ability to identify the age of those long-forgotten files with this utility by JOHN McCRAE

HAVE you ever been looking through your directory of files and wondered "Now when did I write that?" If you have a Master then Date Stamper is the program for you.

Date stamping is a standard feature on much more expensive machines than the BBC Micro and now, because of the real time clock provided in the Master, it is possible to date stamp most files automatically as you save them.

This saves time when you're looking for a reference written months ago. And when you come to delete redundant files, date stamping can also give you a good idea of when the oldest ones on your disc were written.

The program is designed for use on the Master with ADFS as the default filing system. It saves the date and time on to the disc as part of the standard catalog information so it can be read by the *INFO command.

This is possible because none of the View, Viewsheet, Edit or Basic roms use the load or execution addresses of the file which are stored in the disc catalog when the file is saved. So enough space is available for this program to date stamp the file.

After saving a file with the date stamping active typing *INFO * will produce an output like that shown in Figure I.

```
BBCMicro    LR (13) 10051986 00230117 00000BBC 000226
Microuser   WR (23) 24081986 00125631 0000080D 000365
Christmas   LR (54) 25121986 00133045 000000CC 00036D
NewYear     WR (55) 01011987 00000001 00002046 00036E
```

*Figure I: The result of using *INFO with the date stamper in operation.*

The information following the first file name (BBCMicro) indicates that the file was saved on 10 May (05) 1986 and that the time was 23:01 and 17 seconds.

So it is a simple matter to scan the *INFO page when required to see when a particular file was saved. As usual, the 3rd and 4th fields are the file length and the absolute start sector respectively.

Type the program into your Master, save it to disc using a suitable file name – anything except DATE – and run it.

If the checksum is correct the program will be saved to the current directory using the name DATE. If the Bad Checksum is reported, check your listing very carefully against the published listing until you find your error.

Once the file is saved just type *DATE and all subsequent files saved will be date stamped.

You will find it best to save DATE into the root directory of all your View and Viewsheet discs as this makes it easily accessible without loading a utilities disc.

You can load DATE as part of the start up sequence for entering View or Viewsheet by including the following line in your !boot file

```
*$.DATE|M*KEY10*$.DATE|M
```

The Date Stamper works by intercepting the osfile vector which is used by the micro to load and save files. When a call is made to osfile it is processed by the date stamping code and then passed on to the osfile code itself.

There are very few limitations to the program and providing you keep to the following bounds all will run smoothly.

Do not try to date stamp machine code files, otherwise the vital load and execution addresses will be corrupted. If key 10 is not programmed to rerun DATE as described above it will be necessary to type *DATE from the keyboard if the Break key is pressed.

Date Stamper is a very useful utility and the results obtained make it well worthwhile.

How the program works

60	Defines *pblock%*, the location of the osfile parameter block +2 bytes. The first 2 bytes, that is &2ED and &2EE, point to the name to be saved and are not changed.
90	Checks that the computer is a Master.
130	The code starting here sets up the osfile vector to point to the date stamping code and stores the default value of the vector in *oldvec*. The default value is stored to allow the date stamping code to jump to the original osfile code. This is the code that is executed when *DATE is typed.
200	The start of the date stamping code that executes each time a file is saved.
210	Saves the registers.
220	Checks for save command, that is accumulator set to 0. If it is not the save command then exits.
230	Saves 3 bytes which would otherwise be corrupted by the osword call &E to the real time clock.
270	Sets up the parameters to read the real time clock in binary coded decimal format which just happens to be exactly the format required.
300	Executes the call.
310	Copies the real time clock information into the osfile parameter block and also insert a "19" for the century in the right place. This shows both the normal format and the way that date and time information are substituted.
460	Restores the three saved parameters from the stack.
510	Passes control on to the osfile routine.

Date Stamper listing

```
10 REM File Date Stamper
20 REM for Master series
30 REM by J R A Macrae
40 REM (c) The Micro User
50 pbloc%=&2EF
60 FOR I%=0 TO 2 STEP 2
70 P%=&C00:[OPTI%
80 .start
90  LDA#0:LDX#1:JSR&FFF4
100  CPX #3:BEQ master:BRK
110  BRK:]:$P%="Not Master"
120 P%=P%+LEN$P%:[OPTI%:BRK
130.master
140  LDA &212:STA oldvec
150  LDA &213:STA oldvec+1
160  LDA #stamp MOD&100
170  SEI:STA &212
180  LDA #stamp DIV&100
190  STA &213:CLI:RTS
200 .stamp
210  PHP:PHA:PHX:PHY
220  TAX:BNE end
230  LDA pbloc%-1:PHA
240  LDA pbloc%-2:PHA
250  LDA pbloc%+8:PHA
260  LDA #1:STA osbloc
270  LDA #&0E
280  LDX #osbloc MOD&100
290  LDY #osbloc DIV&100
300  JSR &FFF1
310  LDY #0:LDA osbloc,Y
320  STA pbloc%
330  INY:LDA#&19
340  STA pbloc%,Y
350 .loop
360  LDA osbloc,Y
370  STA pbloc%+1,Y
380  INY:CPY #3:BNE loop
390  LDA osbloc+4
400  STA pbloc%+6
410  LDA osbloc+5
420  STA pbloc%+5
430  LDA osbloc+6
440  STA pbloc%+4
450  STZ pbloc%+7
460  PLA:STA pbloc%+8
470  PLA:STA pbloc%-2
480  PLA:STA pbloc%-1
490 .end
500  PLY:PLX:PLA:PLP
510  JMP (oldvec)
520 .osbloc
530  EQUD0:EQUW0:EQUB0
540 .oldvec EQUW0
550 ]:NEXT:sum%=0
560 FOR I%=&C00 TO oldvec+1
570 sum%=sum%+?I%:NEXT
580 IF sum%<>&4096 PRINT"Ba
d Checksum - it should be &
4096":END
590 OSCLI"SA.DATE C00+9E"
600 END
```

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The write machine

Professional writers need machines they can rely on. MIKE GERRARD looks at one man and his micro

THE Writers' Guild of Great Britain is a union for professional writers who work in all areas – films, books, TV, radio, stage and journalism. It recently set up a Word Processor User Group after a survey of its members, their machines and the software they use.

The idea is that members can offer each other mutual support in times of need and disappearing files. Perhaps not surprisingly, the Amstrad PCW proved to be the most popular writers' choice, but second favourite was not an expensive machine like an Apricot, IBM or Apple, but the BBC Micro.

As regards software, TV scriptwriter Tom Brennand uses Edword, another author chooses View, but every other BBC user has opted for Wordwise. The versatility of the program is shown by the fact that it is used for everything from magazine articles to stage plays.

One Writers' Guild member who's experienced in just about every field of writing and has opted for the BBC/Wordwise combination is Alfred Shaughnessy.

Alfred's first TV play was produced over 35 years ago and since then he has written scripts for such series as The Duchess of Duke Street, All Creatures Great and Small, Adventures of an Irish R.M. and Upstairs, Downstairs.

A few years ago he published his autobiography, Both Ends of the Candle, though this was written before he discovered the joys of word processing.

"I'm 70 now, and so I've been writing scripts for films and TV for quite a while", he says, "but I only took to word processing about two or three years ago and I haven't regretted it for one minute since.

"I worked on a portable typewriter first of all, then graduated to an electronic one, so moving on to a computer seemed the next logical step.

"I started writing professionally before the war, when I was in my twenties, doing sketches and songs for West End reviews, because I'm a songwriter as well. But when the war came along and I joined up and spent seven years as a soldier.

"When I came out in 1946 I managed to get a job at Ealing Studios, where they were to make all those marvellous Ealing comedies.

"I began on a very small salary indeed as a reader, which meant that I was reading books, manuscripts and scripts and so on, writing reports on them and their film potential.

"I worked under Michael Balcon and gradually learned everything about filming, and I became a scriptwriter, then a producer and director as well.

"This went on till TV took over for me in about 1960 and I switched to full-time writing, because that had always been the thing that had given me the most satisfaction.

"The first thing I did was on a TV series called The Informer, with Ian Hendry, and it just went on from there, though in fact the first TV play I ever did was broadcast live from Alexandra Palace in 1951. So you can see I've been involved in TV for quite some time".

You might imagine that someone as prolific and experienced as Alfred Shaughnessy would deliberate long and hard before choosing a word processing system for himself, but he explains how the choice of the BBC was made quite quickly and easily.

"I have a friend who's a teacher

→

Alfred Shaughnessy took to word processing a couple or so years ago . . . "and I haven't regretted it"

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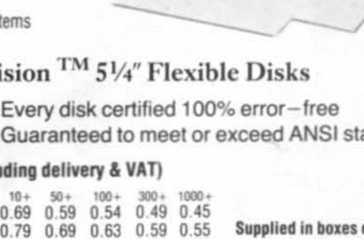

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From Page 113

down in Hampshire, and he had a 32k BBC machine at home with Wordwise on it.

"He asked me one day if I'd seen one of these marvellous machines and knew what they could do. I said that I hadn't and didn't, so I went along to his house to have a look at it and was immediately impressed.

"I sat down and wrote a sample page of script on it and was surprised how easily it could cope with the layout. I even managed to print it out, and felt very pleased with myself for doing that, and I just knew it was the machine for me".

So certain was Alfred in his choice that he immediately went out and bought the identical set-up to the one owned by his teacher friend. He uses a Juki 6100 daisywheel printer, which he recommends, along with a Hitachi disc drive, a Sanyo monitor and the Wordwise chip, which he's been using ever since to produce script after script.

He's also recently started writing his first novel on it, and finds that Wordwise copes equally well with that too, although the program does have a few minor drawbacks.

"Yes, it does have some snags that annoy me, but there aren't too many of them. One is what should be the relatively simple task of underlining words.

"In scriptwriting you have to do a great deal of underlining, and when you do an outline for a script, for example, you must underline each character's name.

"To get this from Wordwise there's a complicated set of secondary use key instructions that I have to feed in off disc each morning before I can start work, although once I've done that I just press f4 to switch on the underlining feature and then f5 to switch it off again.

"The disc feeds in other options to the function keys as well, such as switching proportional spacing on and off, and I dare say if I looked round there might well be better programs available.

"But I stick with this one because it's the one I first learned and I imaging every program is going to have some minor drawbacks to it".

‘The computer's been a godsend, it really has’

As with most writers, Alfred Shaughnessy discovered that word processing made an enormous difference to his working life.

"I can just do things more quickly for one thing, which in turn means that you get through more work and simply earn more money.

"One rather unexpected benefit, I suppose, is that I also actually enjoy working on the machine as opposed to a typewriter where you have to endlessly retype and keep pulling paper out and fiddling with correcting fluid and so on.

"The pleasure of working on the BBC still applies, even though I've had it a few years now. I was a very careless typist which meant that I had a good deal of correcting to do and that's all made very much simpler.

"The word processor has this beautiful feature of allowing you to edit a single sentence as many times as you like without having to continually retype an entire page".

Adapting to the computer didn't prove to be too difficult, and it took Alfred perhaps a couple of months before he was comfortable with both the hardware and the software.

"I think if you've used a typewriter then you're halfway there, as they both have the same QWERTY keyboard, although it could obviously be more tricky if you're used to writing with pen and paper.

"Working habits are so important for some people, but using the word processing program just suits me. It just takes a little time before you start remembering the various embedded commands that you use regularly.

"The snag is that you do have to be very careful and I have on occasion lost a full day's work. Once I even managed to black out the whole lot, most of a script I'd been working on, so I had to sit down and try to remember what I'd written.

"Only last week I had a nasty few hours when I thought I'd lost a script, but I managed to recover it. I do now save my text very regularly, every few pages, and another option is to print out what you've written as well, again every few pages, if you like the security of seeing your work actually in black and white. But I find I'm quite happy knowing I've saved it to disc.

"The machine itself has been very reliable, no problems at all, and that says a lot for the standard of manufacture of them as I use mine a great deal, obviously.

"One aspect that is very sad, but which is enormously helpful to me, is that I no longer need to use the typing agency that I used to go to.

"Many writers use one of these and the one I went to was run by two splendid ladies who would decipher the scripts I gave to them, full of crossings-out, squiggles, bubbles, lines and arrows, and from all that they'd produce a marvellously neat script for me.

"But now I do everything myself. I print out the finished script, perfectly neat, and I also have a photocopier to produce further copies of the script, because you always need to have more than one and photocopying is much quicker than printing several out on the Juki.

"It's terrific to be self-contained like that and not have to rely on someone else.

"Sometimes I would ring the agency up and say I have this great script which is urgently needed and they'd say they wouldn't be able to start on it for a fortnight, which was a nuisance. Not any more, though.

"The computer's been a godsend, it really has, and I'd recommend one for word processing to anyone as long as they're prepared to spend two to three months getting used to it.

"I'm working on it right now to produce a script for the next series of All Creatures Great and Small that the BBC's doing, plus my novel when I have time to get to it, and I think it's terrific". ■

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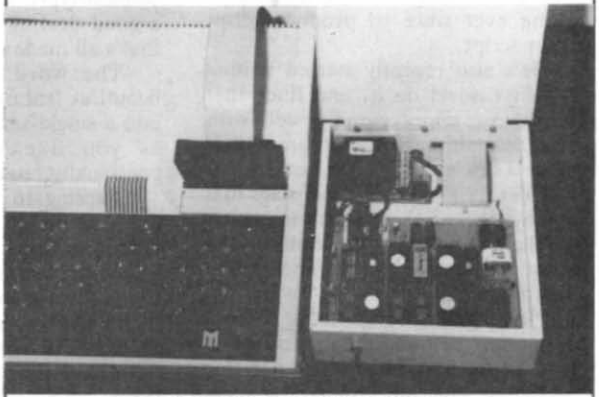

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Putting your Micro on HOLD

HAVING to hold down the Control and Shift keys to stop a listing is awkward if you need both hands free and Control+N is not the best solution. This program provides the ability to stop and start output with Control+S and Control+Q.

By GRAHAM TOAL

The machine code intercepts key presses, sets a flag when Control+S is pressed and clears the flag with Control+Q. The write vector oswrch points to a short piece of code that loops on itself until the flag is cleared.

Because the vectors are redirected, a test is made when the code is installed to stop the vectors from being changed a second time. If this did happen then the vectors would point in circles and hang the computer.

The location used for the flag is in the cassette workspace and could be changed to a different location. But this location is set to &FF on Break which means that the install code can tell when it needs to set up the vectors again – but the program must be re-run.

The code is saved with an I/O processor load and execution address so that it will function correctly with a second processor. By changing the value of *P%* the code can be relocated to any position.

As well as stopping the listing of programs in Basic, it can hold previews of text in Mini-Office II, Wordwise and other word processors, but load the code after you have entered the language.

```
  10 REM "LIST HOLD"
  20 REM by Graham Toal
  30 REM (c) THE MICRO USER
  40 insvec=&22A:wrchvec=&20E
  50 keybuff=0:XoffFlag=&2EC
  60 codestart=&A00
  70 REM Uses Dirty Location
  80 REM Reset to &FF on BREAK
  90 FOR Pass=0 TO 3 STEP 3
 100 REM Stored in cassette buffer
 110 P%=codestart
 120 [OPT Pass
 130 \interception routines
 140 .myinsvec
 150  Cpx #keybuff
 160  Beq testkey
 170 .ignore
 180  Jmp (oldinsvec)
 190 .testkey
 200  Cmp #ASC("S") AND 31
 210  Bne testQ
 220  Lda #&0C
 230  Sta XoffFlag
 240  Rts
 250 .testQ
 260  Cmp #ASC("Q") AND 31
 270  Bne ignore
 280  Lda #&C0
 290  Sta XoffFlag
 300  Rts
 310 .mywrchvec
 320  Bit XoffFlag
 330  Bvc mywrchvec
 340  Jmp (oldwrchvec)
 350 \Initialisation
 360 .entry
 370  Lda #&0C
 380  Cmp XoffFlag
 390  Beq already_in
 400  Lda #&C0
 410  Cmp XoffFlag
 420  Bne install
 430 .already_in
 440  Rts
 450 .install
 460  Sta XoffFlag
 470  Sei
 480 \intercept PUT IN BUFFER
 490  Lda insvec
 500  Sta oldinsvec
 510  Lda insvec+1
 520  Sta oldinsvec+1
 530  Lda #myinsvec MOD 256
 540  Sta insvec
 550  Lda #myinsvec DIV 256
 560  Sta insvec+1
 570 \intercept OSWRCH
 580  Lda wrchvec
 590  Sta oldwrchvec
 600  Lda wrchvec+1
 610  Sta oldwrchvec+1
 620  Lda #mywrchvec MOD 256
 630  Sta wrchvec
 640  Lda #mywrchvec DIV 256
 650  Sta wrchvec+1
 660  Cli
 670  Rts
 680 .oldinsvec BRK:BRK
 690 .oldwrchvec BRK:BRK
 700 ]:NEXT
 710 $&C00="*S.XOFF "+STR$~codestart
+"+80 FFFF0"+STR$~entry
 720 X%=0:Y%=&C:CALL&FFF7
```

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This listing is included in this month's cassette tape offer. See order form on Page 159.

Oscilloscope rules the waves

MIKE COOK speeds up and expands his analogue to digital converter and finds a new application for it

WAY back in March 1984 I described how to add a fast A/D (analogue to digital) converter to your BBC Micro. It proved to be quite popular but now alas all the kits have been sold. So I thought I would make use of the very latest technology to upgrade the project, making it bigger and better.

Bigger because it has eight separate analogue input channels instead of just one. Better because the conversion time is only 2.5μS, as opposed to 15μS. This can be used in many different applications.

For example, use it to digitise speech for adding to your own programs (see the December 1986 issue of *The Micro User*) or for rapid multi-channel signal monitoring.

However, this month I will show you how to make a real time multichannel oscilloscope display using the converter.

At the heart of a project is usually a clever chip and the one at the heart of this month's is the AD7828 made by Analogue Devices. This is quite a remarkable chip as it contains an eight channel analogue multiplexer, or switch, and a fast A/D converter.

Your BBC Micro has a four channel multiplexer on its analogue input port. This selects one of four inputs to be passed to the A/D converter so by switching between each channel it can appear that there are four different A/D converters.

The AD7828 works just the same only with eight channels but the difference comes when it comes to making the conversion. Your BBC Micro takes 10mS to convert a voltage into a digital value whereas the AD7828 takes just 2.5μS – which is 4,000 times as fast.

To be fair, your micro makes a 10 bit conversion and the AD7828 makes only an eight bit one, but most of the time eight bits is enough.

The AD7828 works so fast because it uses a different technique to your BBC Micro, a technique that we have not covered before in the Body Building Course – that of flash conversion.

Flash conversion was named after its inventor, a Mr Gordon, and is the technique used in digitising real time video signals. In its full form a flash converter can work at rates of 30 million samples a second – and is quite expensive.

The technique is simple enough though, consider Figure I. This shows a two bit flash converter using three comparators and four identical resistors.

A comparator is just an operational amplifier with high gain. If the positive input is at a higher value than the negative input we get a high voltage on the output, if it's the other way round we get a low voltage. Thus we compare the two voltage inputs and the output tells us which one is bigger.

The positive input of each comparator is connected to a chain of identical resistors, these being fed by a reference voltage. They act as a potential divider making the comparator input voltage increase by equal amounts as you go up the chain.

The input we wish to digitise is sent to the negative input of all the comparators. If this is below the level of the voltage on the lowest comparator all the comparators will output zero.

If we start to increase the input we will reach a point when the lowest comparator produces a logic one. If we increase it even more there will be more comparators producing a logic one.

Basically all the comparators with a positive input below the input voltage will be on and all those above will be off, as summarised in Table I. The encoder simply turns this sequence of inputs into a normal binary number.

The time taken to digitise an input is simply given by the time it takes one comparator to switch – it's done in a flash.

So far so good, but this only digitises a voltage into one of four different values: It is a two bit comparator. As we increase the number of bits the number of comparators increases rapidly, so for three bits we need seven comparators and for four bits we need fifteen.

If we were to make an eight bit comparator with this technique we would need 255 comparators. In general for an N bit converter we

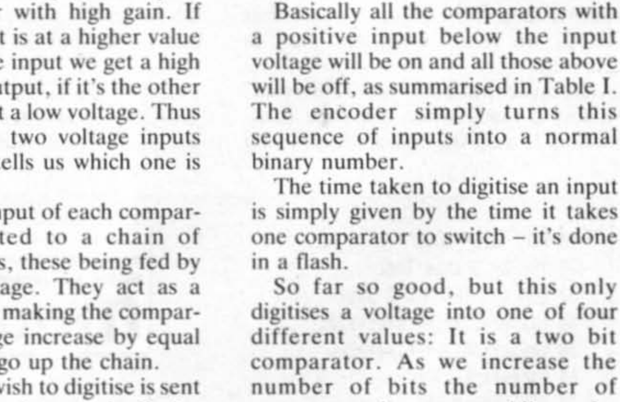


Figure I: A flash converter

need 2^N-1 comparators. Integrated circuits of 8 bit flash converters are available but they cost several hundred pounds.

The AD7828 makes use of a half flash conversion technique that cuts down drastically on comparators at the expense of a little extra time spent in the conversion process.

Figure II shows the innards of the AD7828 so we can see how it works. One of eight analogue inputs is selected by the logic levels on the multiplexer's (mux) select lines. The selected channel is fed to two places, flash converter 1 and a voltage subtractor.

Flash converter 1 is a four bit flash converter and produces the four most significant bits of the conversion. This is a coarse conversion consisting of only 16 possible values or steps.

These are fed to a digital to analogue converter to produce an analogue representation of the input voltage in coarse steps. This is then subtracted from the original input voltage to leave an error voltage – the difference between the actual value and a four bit representation of it.

This is then fed to flash converter 2. As the reference voltage feeding this flash converter is one sixteenth of the voltage feeding the first one, it will digitise this error voltage. Hence it will fill in the gaps in the coarse 16 level result from the first converter. As each of the 16 levels from converter 1 can be filled with any one of 16 levels from converter 2 we have 16×16=256 possible values.

The AD7828 is designed to be connected to a microprocessor's bus and all its input signals are geared around that. However, I always try to avoid putting projects on to the 1MHz bus whenever possible as that makes them so much more expensive. So with a degree of cunning I have squeezed the AD7828 on to the user port – Figure III shows how.

Its simplicity belies the thought that went into it. Basically all the data bits on the user port are used to input the digital reading, which leaves only the two control bits to perform the interfacing.

What happens is that whenever we want to start a conversion we make CB2 pulse, which can easily be achieved by writing to the user port after previously defining the CB2 pulse mode.

THE BEEB BODY BUILDING COURSE

Comparator number			*Binary Output*
3	*2*	*1*	
0	*0*	*0*	*00*
0	*0*	*1*	*01*
0	*1*	*1*	*10*
1	*1*	*1*	*11*

Table I: Flash converter comparator patterns

This pulse is fed to the chip enable and the read enable on the AD7828 and starts off the conversion process. At the same time the pulse is fed to a binary counter which in turn feeds the channel select lines of the AD7828.

This means that successive reading will be of different channels thus we can scan all eight channels. However, if we have an application where we do not wish to use all channels the links L1 to L3 will allow us to have 1, 2, 4 or 8 channels scanned, without further software intervention.

The relationship between links and channels scanned is shown in Table II. This is a sensible sequence with channel 0 always being scanned and the other channels being progressively added.

It is achieved by inverting the outputs of the binary counter and labelling the analogue input in the reverse order of that given in the data sheet. In effect we are making the counter count down by inverting its outputs, and by removing links we are limiting the lower number.

The counter always resets to zero and this is translated to seven by the inverters so input seven is simply labelled input zero. Don't worry if you don't follow that as it is not vital to the project.

The only snag with having a counter automatically change the input channel is that initially you don't know what the counter is reading as it can power up with any value on its inputs. We need some way of resetting it so we know where we are starting from. Also, it is useful to be able to reset the counter if we want to scan say only the first five channels.

To the rescue comes CB1. Now hands up all those who thought that this control line could only be used as an input. Well you're nearly right. However, when you activate the shift register in the VIA you can obtain a mode that registers data under control of the system clock.

In this mode the data goes in on CB2 (about which we couldn't care less) and the system clock appears on CB1. Hence we can get 8 pulses out of CB1 – their duration depends on the setting of timer 1. As we only want to use this pulse as a reset it matters not that there are eight of them instead of just one.

Finally the circuit in Figure III needs a reference voltage. This is connected to the power rails. However, by removing links L5 and

→

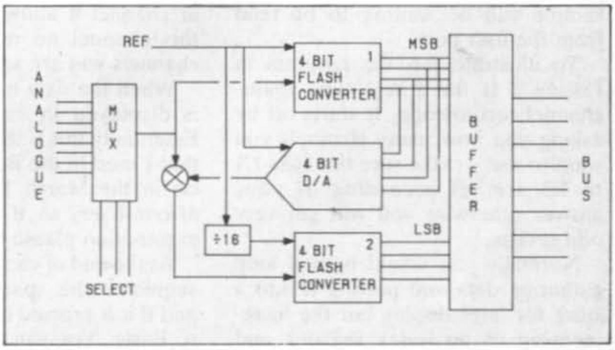


Figure II: The block diagram of AD7828

From Page 119

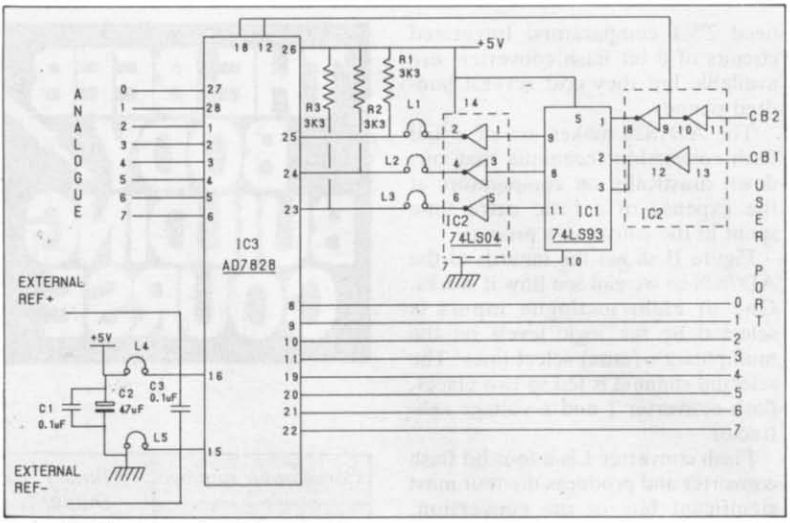


Figure III: The circuit of the Super Fast A/D converter

Links made	*Channels Scanned*
L1 L2 L3	*0 1 2 3 4 5 6 7*
L1 L2	*0 1 2 3*
L1	*0 1*
no links	*0*

Table II

L4 you can apply your own external reference.

The AD7828 is unusual in that it will accept both a positive and a negative reference. This means that the positive reference can be lowered to give added sensitivity or the negative reference can be raised to compensate for an offset voltage.

Both voltages should be within the power rails, however, and the negative reference should not be greater that the positive.

As to construction, I made the prototype on vero board but I have produced a printed circuit board. It is available along with all other components as Body Build pack No.39 using the accompanying order form.

You will need a ribbon cable and two connectors (as found in Body Build pack No.2) to connect it to the user port if you have not already got one. The analogue inputs along with the power rails and reference voltages are brought out on the board to a twelve way screw connector for ease of use. The five links are pins with shorting links of the type found inside your micro.

Construction is straightforward and consists of simply soldering all the components in place. Incidentally I once got a kit returned from an angry mother who said it would not work; her son had used Superglue to fix all the components on. When I pointed out that they should be soldered on, she asked how a boy of 13 was supposed to know such complex things!

Reading the converter is simple, read the value on the user port, write to the user port (thus starting the next conversion off) and do something with the value you have just read. By which time your next sample will be waiting to be read from the user port.

To illustrate this the program in Listing 1 is for a real time multichannel oscilloscope. It starts off by asking you how many channels you want to use – make sure the links L1 to L3 are set according to your answer otherwise you will get very odd results.

Normally you would have a loop gathering data and putting it into a store for later display but the incrementing of an index register and looping back all take time.

To squeeze the maximum sample rate I have resorted to a trick: The read, write and store sequence is repeated 256 times with the store instruction being to a different location each time. Thus no time is spent going round in loops and data is gathered in at the maximum possible speed, a sample every 8µS.

The converter only takes 2.5µS but the poor old BBC Micro can't keep up with that rate. This long sequence of instructions is not typed in in assembler but put directly into memory by the lines 210 to 270 in the program.

The last instruction in line 270 is a return from subroutine. Lines 480 to 620 act as a trigger, they always look at channel 0 allowing triggering on this channel no matter how many channels you are scanning.

When the data has been read in it is displayed in lines 670 to 1060. Essentially this is the same technique that I used in the Body Building article in the March 1984 issue of *The Micro User*, so if you need a full explanation please refer to that.

At the end of each scan and display sequence the spacebar is checked and if it is pressed control is returned to Basic. You can then examine the waveforms by expanding them and even joining up the sample dots.

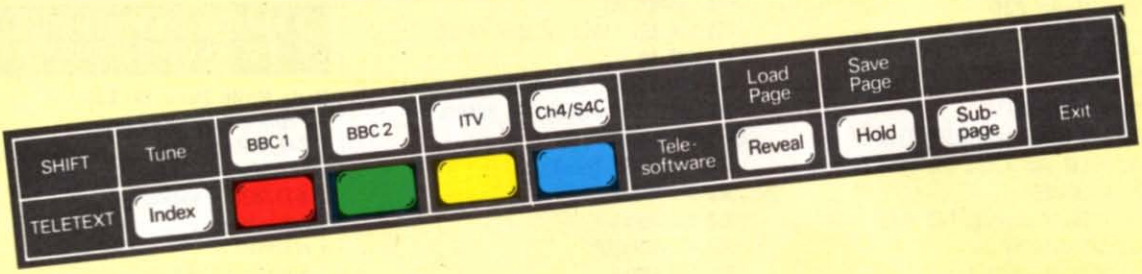
Note that if you don't put in a trigger level or enter it as zero no triggering will take place and the program will continously sample the input channels. However, if you do put in a trigger value you will not see anything until the voltage on channel 0 makes a positive transition of that value.

The inputs to the AD7828 are fairly high impedance and if you do not feed them with a DC level they will tend to float at any level. With no input receiving a DC value this level will tend to be half the reference voltage but cross talk from other channels will occur.

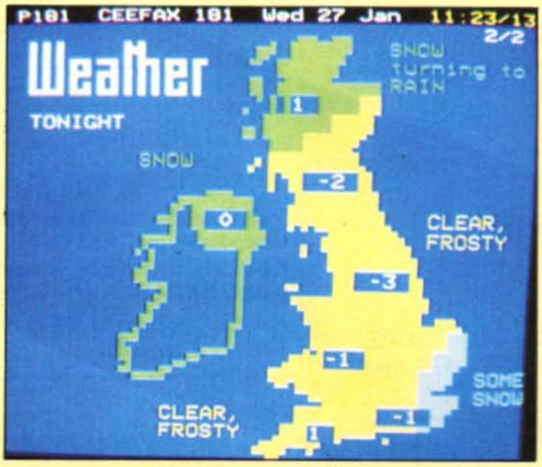
If you want to make a really good oscilloscope you can feed each input from an operational amplifier connected as a voltage follower and even introduce a DC bias to separate the channels.

I have written a program to use this Super Fast A/D converter to gather speech data for making your micro speak. The basic technique was described in the December 86 Micro User. Unfortunately there is not enough room to print it here so it is being made available on MicroLink or you can request a copy of the listing when you place your order for the board.

● *Well that wraps it up for this time. Thanks for reading and I'll see you next month.*


SHIFT
TELETEXT
Tune
Index
BBC 1
BBC 2
ITV
Ch4/S4C
Tele-software
Load Page
Reveal
Save Page
Hold
Sub-page
Exit

Turn your BBC Micro into a teletext receiver!


P181 CEEFAX 181 Wed 27 Jan 11:23/13
2/2
Weather
TONIGHT
SNOW
SNOW turning to RAIN
1
-2
0
CLEAR, FROSTY
-3
-1
SOME SNOW
CLEAR, FROSTY
-1
1

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They emphasise that these problems only affect a few areas of the country. However, if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service on 01-927 5040

TO ORDER TURN TO THE FORM ON PAGE 159

From Page 120

Listing I

```
   10 MODE4
   20 HIMEM=&52FF
   30 DIM CODE% &B0,ADIN% 2326
   40 PRINT TAB(0,5);"THE BEEB BODY B
UILDING COURSE"
   50 PRINT"Number 47 FEB 1987"
   60 PRINT:PRINT
   70 PRINT"By Mike Cook"
   80 PRINT
   90 PRINT
  100 PRINT"FAST A/D CONVERTER OSCILL
OSCOPE"
  110 PRINT
  120 INPUT"Number of channels to use
",C%
  130 IF NOT(C%=1 OR C%=2 OR C%=4 OR
C%=8) THEN PRINT"1 2 4 OR 8 only": GO
TO 120
  140 PRINT
  150 N%=0
  160 !&FE64=0
  170 ?&FE6E=&7F
  180 ?&FE6B=&08
  190 A%=?&FE6A:REM RESET CHANNEL SEL
ECT
  200 PRINT"INITIALISING"
  210 FOR A%=ADIN% TO ADIN%+2304 STEP
 9
  220 ?A%=&AD:A%?1=&60:A%?2=&FE
  230 A%?3=&8D:A%?4=&60:A%?5=&FE
  240 A%?6=&8D:A%?7=N%:A%?8=&53
  250 N%=N%+1
  260 NEXT
  270 ?A%=&60
  280 ?&FE62=0
  290 ?&FE6C=(?&FE6C AND &F) OR &B0
  300 ?&86=&80:?&80=00:?&81=00
  310 M%=&5600
  320 FOR A%=0 TO 31
  330 FOR B%=0 TO 7
  340 T%=A%*&140+B%+&5800
  350 ?M%=T% MOD 256
  360 M%?&100=T% DIV 256
  370 M%=M%+1
  380 NEXT
  390 NEXT
  400 FOR I%=0 TO 3 STEP 3
  410 P%=CODE%
  420 [
  430 OPT I%
  440 .START SEI
  450 LDA &81  \GET TRIGGER VALUE
  460 CMP #0
  470 BEQ NTRIG  \TO NO TRIGGER POINT
  480 \WAIT FOR A POSITIVE TRANSITION
 OF THE TRIGGER POINT
  490 .TLOW LDA &FE6A
  500 STA &FE60
  510 NOP:NOP:NOP
  520 NOP:NOP:NOP
  530 LDA &FE60
  540 CMP &81
  550 BCS TLOW
  560 .THI LDA &FE6A
  570 STA &FE60
  580 NOP:NOP:NOP
  590 NOP:NOP:NOP
  600 LDA &FE60
  610 CMP &81
  620 BCC THI
  630 \READ IN 256 SAMPLES
  640 .NTRIG STA &FE60
  650 JSR ADIN%
  660 CLI
  670 \DISPLAY SAMPLES
  680 .SLINE LDX #0
  690 STX &87
  700 .LOOP LDX &80
  710 \GET ADDRESS OF POINT TO ERASE
  720 LDA &5400,X   \GET LSB OF ERASE
 POINT
  730 STA &82
  740 LDA &5500,X    \GET MSB OF ERAS
E POINT
  750 STA &83
  760 LDA &5300,X    \GET VALUE TO PL
OT
  770 EOR #&FF      \INVERT TO COMPENS
ATE
  780 TAY
  790 LDA &5600,Y  \LOOK UP LSB OF FI
RST COLUM
  800 CLC
  810 ADC &87      \ADD X VALUE
  820 STA &84      \STORE MSB OF PLOT
ADDRESS
  830 STA &5400,X \STORE ERASE ADDRES
S
  840 LDA &5700,Y  \LOOK UP MSB OF FI
RST COLUM
  850 ADC #0       \ADD X VALUE
  860 STA &85   \STORE MSB OF PLOT AD
DRESS
  870 STA &5500,X \STORE ERASE ADDRES
S
  880 LDX #0
  890 \REMOVE OLD POINT
  900 LDA (&82,X)   \GET OLD DISPLAY
BYTE
  910 EOR &86        \INVERT APPROPRIA
TE BIT
  920 STA (&82,X)   \WRITE TO SCREEN
  930 \PLOT NEW POINT ON THE SCREEN
  940 LDA (&84,X)   \GET DISPLAY BYTE
  950 ORA &86        \SET APPROPRIATE
BIT
  960 STA (&84,X)   \WRITE TO SCREEN
  970 \MOVE POINTERS TO NEXT X POSITI
ON
  980 INC &80  \X POINTER
  990 ROR &86  \PIXEL MASK
 1000 BCC LOOP
 1010 LDA #&80       \RESTORE MASK BIT
 1020 STA &86
 1030 LDA #7   \ADD 8 TO X VALUE
 1040 ADC &87 \IT IS 8 AS CARRY IS SE
T
 1050 STA &87
 1060 BNE LOOP  \LOOP IF NOT FINISHED
 ALL POINTS
 1070 LDA #129
 1080 LDX #&9D
 1090 LDY #&FF   \TEST FOR SPACE BAR
 1100 JSR &FFF4
```

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```
 1110 TXA
 1120 CMP #&FF
 1130 BEQ FIN
 1140 JMP START
 1150 .FIN RTS         \FINISH WHEN SP
ACE PRESSED
 1160 .SGET LDA &FE60
 1170 STA &FE60
 1180 RTS
 1190 ]
 1200 NEXT
 1210 CLS
 1220 VDU 24,0;0;1023;1023;
 1230 VDU 28,32,31,39,0
 1240 CLG
 1250 PROC_SETUP
 1260 PRINT"Expand"
 1270 PRINT"Trigger"
 1280 PRINT"Run"
 1290 PRINT"?";
 1300 A$=GET$
 1310 IF A$="R" THEN PROC_WIPE:PROC_S
ETUP:PRINT"RUNNING":CALL CODE%:PRINT:
PRINT"NOW:-":GOTO1260
 1320 IF A$="T" THEN PRINT:INPUT"VALU
E",T%:?&81=T%:GOTO 1260
 1330 IF A$<> "E" THEN 1300
 1340 PRINT
 1350 PRINT"SCALE"
 1360 INPUT S%
 1370 IF S%<1 OR S%> 100 THEN PRINT"T
OO MUCH":GOTO 1350
 1380 PRINT"JOINED ?"
 1390 A$=GET$
 1400 IF A$="Y" THEN J%=5 ELSE J%=69
 1410 CLG
 1420 FOR A%=1 TO C%
 1430 P%=&5300+(A%-1)
 1440 X%=(-S%*4)*C%
 1450 MOVE 0,?P%*4
 1460 REPEAT
 1470 X%=X%+(S%*4*C%)
 1480 PLOT J%,X%,?P%*4
 1490 P%=P%+C%
 1500 UNTIL X%>1019 OR P%>&53FF
 1510 NEXT
 1520 GOTO 1260
 1530 DEF PROC_WIPE
 1540 CLG
 1550 FOR A%=&5400 TO &55FF
 1560 ?A%=&C0
 1570 NEXT
 1580 ENDPROC
 1590 DEF PROC_SETUP
 1600 CLS
 1610 PRINT
 1620 PRINT" SCOPE "
 1630 PRINT
 1640 PRINT"TRIG ";?&81
 1650 PRINT
 1660 PRINT"SPACE TO";
 1670 PRINT" FREEZE"
 1680 PRINT" TRACE"
 1690 PRINT
 1700 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

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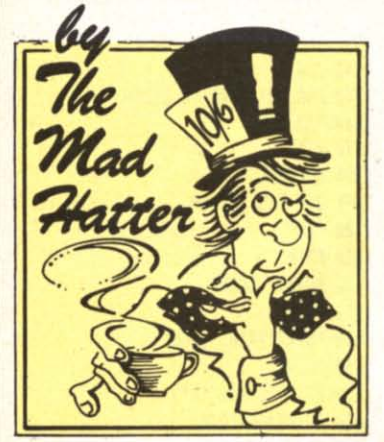

Magik's spells may even put years on you

I'VE had plenty of letters from ladies this month.

Sheila Thomas, who's just invested in a Master, is looking forward to huge text adventures on disc. Aren't we all! What about some conversion jobs of adventures done for Apple, Commodore 64 and the other larger memory machines?

Mrs Pat Winstanley runs Adventure Contact, aimed at helping adventure game writers rather than solvers. It looks good to me; anyone interested should contact Pat at 13, Hollington Way, Wigan WN3 6LS, not forgetting to enclose an sae.

When I reviewed The Price of Magik by Level 9, I mentioned that it needed a special mapping technique.

The actual basics of location number, description, exits and so on remain the same – what differs is the way you handle objects and explore their possible uses. So, I'm including some advice in this month's column.

Any game with scoring based on the way in which the player handles the environment, (rather than on the simple collection of treasures), is necessarily more complex. It is inevitably a more difficult adventure, too.

I am going to illustrate one way of dealing with this sort of adventure by giving a commentary on the first locations that I mapped in The Price of Magik. You can use the logical map shown in Figure I for reference.

First, notice how I resisted the temptation, (yield not to temptation, and all that stuff), to go in at the door for a very long time.

It is always sensible to explore areas outside first, particularly if it looks as though the bulk of a game's action is to take place inside a house, castle, cave or whatever.

Second, I must emphasise that many of the comments alongside the locations and objects were not added immediately, but quite late in the game as I found out what things to use and how. You must keep on testing everything.

Third, the saves indicated on the map are the *serious* ones, used to make sure I had a permanent record of the game to that particular location. They are not the temporary saves I regularly use to make sure I don't get damaged at potentially dangerous points.

Thus, when I attempted to pick up the mandrake (location 003), it screamed and I was asked whether I wanted to continue or not. I saved (a temporary one) before carrying on and once I was sure that it was safe, I erased that section of tape.

Exploring the Woodshed involved examining each item – thus the candle proved to be lit and the woodpile had something nasty in it. Common sense suggested an experimental bonfire.

Very few things in an adventure game are entirely useless, so I carried the ash along with me.

The name "eyebright" suggested cosmetic connotations: And as I used to be an optician, I thought it also

HELPLINE

*Thanks to Nigel Allen and Simon Kemp, here are some of the answers Carl Noffki and Helen Thewliss need in **Philosophers Quest**.*

Solicitors Office: Enter the Smooth Maze, go W, NW, and N for the platypus then W to the office. Drop the will here.

Albatross: To take it, light one match, not the lamp – leave it till last.

Whale: Strike matches and move opposite to the smoke direction, then light the driftwood to get out. (I found that quite often W, W and N took me to the tooth, though a random element is at work.)

Take a bottle of ink, keys, driftwood, matches, lamp and the aqualung to deal with the wreck and whale.

You can dump the keys after use, and the bottle of ink disarms the octopus, so you should then have hands free for the treasures.

Philosophers Library: Once you have solved the non-existence problem by cogitating, go back for the lamp which you left at the previous location, enter the library and you can see a book (a treasure).

The stars indicate a dog is hidden nearby.

*Matthew Ashton can't get through the tunnel under the hedgerow in his disc version **Lord of the Rings**.*

In my tape version you go E from the entrance to the tunnel, light a match and go E again. The match then goes out and you have completed part one.

*Mrs S.M. Read is just short of getting into the endgame of **Colossal Adventure** — her main mistake has been not to give the*

HALL OF FAME

Here is a bit more of Stuart Booth's solution to **Snowball**.

The janitor droid: Go to the Rubbish Tip and attach the probe to the droid. Search the surrounding area for the required part and give it to the droid (50). The probe has no other use.

The droid controller counters: Go to both corners of the Droid Counters and take the red and green tickets.

A ticket can be replaced by using it and returning to the ticket machine.

The droid with the red form, the yellow form and the lance wants red tickets and will be called Red. The other droid wants green tickets and will be called Green.

Give the red ticket to Red and take the red form. Give the green ticket and the red form to Green and take the orange form to Red and take the yellow form.

Give a green ticket and the yellow form to Green and take the green form. Replace the red ticket only. Give the red ticket and the green form to Red and take the lance. The tickets have no further use.

suggested a herbal seeing aid. So I tried rubbing it into the eyes – and this turned out to be the right thing to do.

Again, note that when something odd happened, such as the results of

→

eggs to the Troll. These are recovered later by saying FEE FIE FO FOO.

J. Smallwood is having problems with ***Erik the Viking*** *and can't find the Enchanter's study.*

Now the only Enchanter I know in this game is female, dwells in a Red Room.

She can be found by going N from the launch site then W, W, N, N, N and IN.

If this isn't what he means, perhaps he'd like to write in again, enclosing an sae if he wants a personal reply.

Room	Description	Exits	Move	Result
001	Winding drive	Woodshed Vine Door	W U IN	002 004 041
002	Woodshed candle and woodpile (light) (Take woodpile ash!)	Drive Herb garden	E W	001 003
003	Herb garden: cross, mandrake eyebright (rub in eyes) mandrake releases skull and knucklebone (examine) remove (diamond) ring from knucklebone, bury all human bones with shovel	Woodshed	E	002
004	On a vine	Vine Drive	U D	005 001
005	On a vine	Vine top Vine	U D	006 004
006	Vine top	Sloping roof Vine	U D	007 005
007	Sloping roof	Roof Vine top	U D	008 006
008	Roof	East attic Sloping roof	W D	009 007
009	East attic: (eyebright) mirror covers S wall cut mirror (diamond)	Roof Alcove West attic Recess	E N W S	008 010 011 112
010	Alcove: wardrobe, robes (wear)	East attic	S	009
011	West attic: cage (take)	East attic Attic exit	E SW	009 012
012	Attic exit	West attic Office Landing	NE SE W	011 013 014
013	Office: table (exam) table inscribed MAD, knife sharp scroll: CAST spell	Attic exit	NW	012
014	Landing	Attic exit Stairway	E D	012 015
015	Stairway	Oak/p corridor Landing Hole	E U D	016 014 031
016	Oak-panelled corridor	Misty corridor Oak-p corridor Stairway	N SE W	017 018 015
017	Misty corridor: FOM, wheel (Bat?)	Oak-p corridor Beneath Gallows	S NE E	016 023 096
018	Oak-panelled corridor Saved – tape count 35-50 Saved – tape count 140-155 CAST SEE, push panel	Pentagonal room White wood corridor Oak-p corridor Secret exit	N S NW E	019 097 016 111
019	Pentagonal room: FOM	Little landing Oak-p corridor	NE S	020 018
020	Little landing	Table room Musty hall Pentagonal room Beneath gallows	NE S SW W	021 026 019 096

Figure I: My logical map for Price of Magik

From Page 125

picking up the mandrake, I examined everything a second time – and just as well, too!

You should also be aware from the way the map is written that I had a good look at the vine and used that means to enter the house for the early exploration. I was afraid that something nasty would be lurking on the other side of the front door.

The letters FOM simply record those locations where "a Feeling of Magik" was part of the location description – it appears to be a clue that a magical object will be found somewhere nearby.

How do you find spells? Every so often, as you examine a room, you come across a 3-letter word in capitals.

Providing you have taken everything you can along the way and also have located and read the scroll, I suggest you CAST every three-letter word (such as FLY) that you have come across. Your superior status is steadily increased.

A price has to be paid for all this superiority though. Age has an uncomfortable habit of creeping up on the unwary explorer.

There comes a time when, in addition to shaken sanity, decrepitude sets in with a vengeance and the antidote must be sought.

I may not be a chapel-goer by inclination, but such a venture can be useful: It gave me a new lease of life. Thus, I have managed to feel 20 years old again and then approach middle-age once more.

Peter Austin provides the sort of sensible help in the game that is a model for others to follow.

So if you haven't yet collected the vital object enabling you to CAST the spell, (the focus), you will be told what it is. If you have the focus then you will be told if the spell works or not.

The game also has my answer to mazes, even though it has at least one traditional-type maze.

Red Moon was the first game I came across with the one-way exit idea and it is used to great effectiveness in the Store Room complex of this its sequel. Careful descriptions and meticulous mapping are essential here.

You leave a location, the door closes behind you and you may end up either in a place which has only one exit (not the one you came through) or else in a familiar place (mapped) which certainly does not indicate the exit through which you arrived.

This is NOT a bug – it is the thinking person's answer to a maze.

Finally, note that when I found something that enabled me to CAST the SEE spell, I took time off to re-explore most likely locations searching for secret exits.

Casting a spell always involves the ageing penalty, but the exploration was worthwhile.

Since I'd saved my status before starting the search for secret exits, once the exploration was complete I restored that position and was then able to carry on in the adventure without actually having paid any penalty.

● *See you next month. Happy adventuring.*

PROBLEM CORNER

Edward Gill has been struggling with **Castle of Riddles** for two years. Can anyone let him know what word is needed to escape from the black maze?

Sheila Thomas quite liked the **Ket** trilogy, though she found part three and its riddles too obscure so never finished it. Has someone a solution?

She is also stuck on **Tower of Despair, Spoof, Temple of Vran** and **Adventure 200**, and wants to know why she gets "Out of memory" messages towards the end of **Sherlock**?

I don't know the answers to any of these, so over to you readers: Solutions are welcomed.

If Julian Gregory of Broadstone (who has 100 adventures for the BBC Micro. 39 of them completed) cares to send me a list of them, I'm almost sure to be glad of a map or two.

David Chamberlain has done his best to make Program Power's **Adventure** reveal all, but he still can't bump off the rat or find the password. Who can help him?

PROBLEM

ON vacation last year in the UK I bought an HCR – rom box for a BBC Micro B. As I tried to link it to my micro I found a completely different PCB inside than on my own issue 7 motherboard.

The installation instructions from HCR told me to make links to the plug S21 on the board, but I couldn't find a plug with that number. The following figures are printed on the PCB version:

223.000 ISS I 1983
763 001 059
02 – GBN 14 – 10 000 46

I believe this is a special German version – the computer is complete in a metal case to eliminate RF distortion.

Without any circuit diagram or information on how to locate the correct plug to link the remaining wires it is impossible to get the rom box working. Could you please help? – Ewald Boening, DF1AU.

SOLVED

Sorry this is the first I have heard of a special German board. However S21 should not be hard to find as it should perform the same function on all versions of the board, and there is no reason to suppose that the circuit has been redesigned.

What you need to do is to look for a link that connects up to pin 15 of a 74LS139 and pins 3 and 11 of a 74LS00. On my circuit these ICs are labelled IC20 and IC21 respectively – so start looking there.

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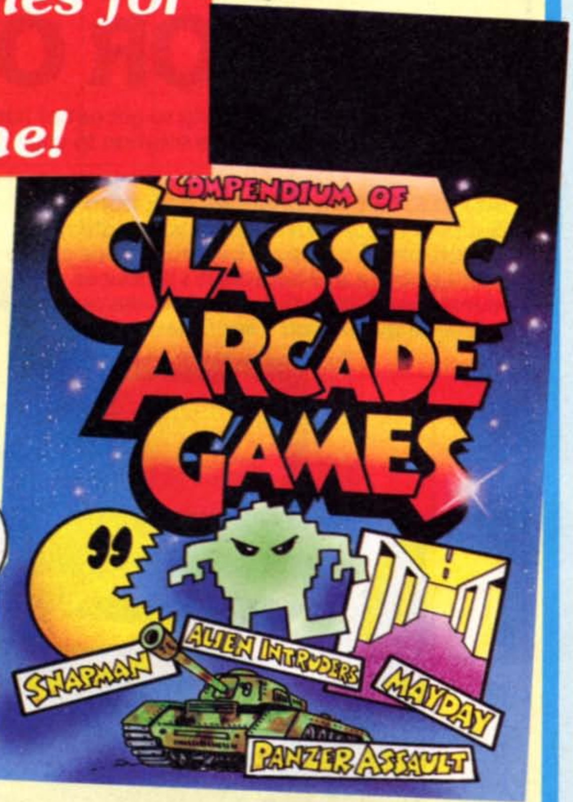
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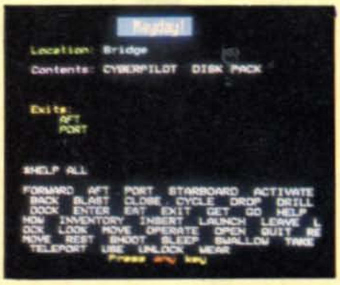

```
Mayday!
Location: Bridge
Contents: CYBERPILOT DISK PACK

Exits:
   AFT
   PORT

>HELP ALL

FORWARD AFT PORT STARBOARD ACTIVATE
 BACK BLAST CLOSE CYCLE DROP DRILL
 DOCK ENTER EAT EXIT GET GO HELP
HOW INVENTORY INSERT LAUNCH LEAVE L
OCK LOOK MOVE OPERATE OPEN QUIT RE
MOVE REST SHOOT SLEEP SWALLOW TAKE
 TELEPORT USE UNLOCK WEAR
           Press any key
```

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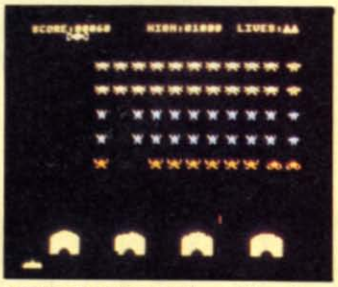
SCORE:00060 HIGH:01000 LIVES:AA

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TO ORDER TURN TO THE FORM ON PAGE 159

WORDWISE PLUS PLUS

By ALEC WHITFIELD

SEVEN characters is a definite limitation when it comes to remembering what is in a file called BGOFDIC. This Wordwise Plus Index overcomes the problem by allowing you to keep a list of text file titles and descriptions, and to load and save the texts directly.

To set up the system type the files LoadPrg, Index and !boot into Wordwise and save them. You will notice there is only one file in the index at the start and that is Index itself. Finally the disc auto-start option should be set to *OPT4,3, and Shift+Break pressed.

To use the system press Shift+f9. This calls the Index program which loads the index into segment 8, places the cursor at the first item in the index and waits for a key to be pressed.

Use the up and down cursor keys to select the file that you want – the left and right keys move to the top and bottom of the list. When a file has been selected press the appropriate command key.

The way the system works is quite simple. Pressing Shift+Break executes the !boot file which first suppresses output to the screen then selects Wordwise Plus. The two colon-immediate commands load the Index program into segment 9.

If the commands were being typed in, the Press any key message would follow, so X clears this request. Finally 9 selects the main menu, *FX3,0 turns the screen back on and another X clears it back ready for your commands.

```
*FX3,6
*W.
:SELECT SEGMENT 9
:LOAD TEXT "LoadPrg"
X
9
*FX3.
X
```

```
  ### INDEX OF WORDWISE FILES ###

***********************************
* Press L : load file.            *
*       C : load file to cursor.  *
*       S : save text as title.   *
*       D : delete text and title.*
*       A : add a new file.       *
***********************************

INDEX This list.
```

The L and C commands call Wordwise commands directly to load the text. The others call the procedures that are listed in the table.

The program is self-explanatory but the line beginning DOLINE is a little strange. It sets the page format for previewing the loaded text and makes use of the PAPER! message to hold the text at the end of each screen. Pressing any key scrolls to the next screen. ■

MAIN PROCEDURES

add	Adds a new title and description to the bottom of the index and saves the new version.
delete	If the main text area is empty, loads the chosen file and asks to delete it from disc. The index entry is deleted as well and finally the new index is saved.
save	Checks there is text to save, checks you want to overwrite, then saves the file. Finally it re-enters the Wordwise text area.

MAIN VARIABLES

G%	Keyboard response.
W%	Word count: If zero then there is no text.
F$	Current text file title.
G$	Temporary string.
N$	Index entry

```
REM WORDWISE PLUS INDEX
REM by Alec Whitfield
REM (c) THE MICRO USER
SELECT SEGMENT 8
LOAD TEXT "Index"
.start
SELECT SEGMENT 8
CURSOR TOP
FIND "INDEX"
DISPLAY
*FX4,1
  REPEAT
  G%=GET
  IF G%=136 THEN CURSOR TOP
  IF G%=137 THEN CURSOR BOTTOM
  IF G%=137 THEN CURSOR AT
  IF G%=139 THEN CURSOR UP
  IF G%=138 THEN CURSOR DOWN
  DISPLAY
  G%=G% AND &5F
  U.G%=65ORG%=67ORG%=68ORG%=76ORG%=83
*FX4,0
IF G%=65 THEN GOTO add
F$=""
  REPEAT
  G$=GCT$
  F$=F$+G$
  UNTIL G$=" "
CLS
SELECT TEXT
IF G%=67 THEN LOAD TTC F$
IF G%=68 THEN GOTO delete
IF G%=76 THEN LOAD TEXT F$
IF G%=83 THEN GOTO save
DEFAULTS
DOLINE "|Gep|Gpl25|Gem|Sts |Gbs "
PREVIEW TEXT
DISPLAY
```

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```
END
.add
CURSOR BOTTOM
TYPE CHR$(13)
TYPE CHR$(13)
CLS
PRINT "  Enter the new file title:"
PRINT
F$=""
  REPEAT
  G$=GCK$
  IF ASC(G$)=32 THEN G$=""
  PRINT G$;
  IF ASC(G$)<>13 THEN F$=F$+G$
  UNTIL LEN(F$)=7 OR ASC(G$)=13
PRINT
PRINT
PRINT "  Enter the new file
description:"
PRINT
N$=F$+CHR$(32)+GLK$
TYPE N$
SAVE TEXT "Index"
SELECT TEXT
GOTO save
.delete
IF W%=  THEN LOAD TEXT F$
CURSOR TOP
DISPLAY
VDU31,5,5
PRINT "DO YOU WANT TO DELETE"
VDU31,1 ,7
PRINT "FILE '"+F$+"'? (Y or N)"
VDU7
G%=GET AND &5F
IF G%<>89 THEN GOTO start
OSCLI "DELETE "+F$
SELECT SEGMENT 8
CURSOR AT
  REPEAT
  DELETE WORD
  UNTIL GCT$=CHR$(13) OR EOT
DELETE LEFT
SAVE TEXT "Index"
GOTO start
.save
CURSOR TOP
DISPLAY
IF W%=  THEN GOTO notext
VDU31,5,5
PRINT "DO YOU WANT TO SAVE THIS"
VDU31,1 ,7
PRINT "AS '"+F$+"'? (Y or N)"
VDU7
G%=GET AND &5F
IF G%<>89 THEN GOTO start
SAVE TEXT F$
DISPLAY
END
.notext
VDU31,5,5
PRINT "THERE IS NO TEXT TO SAVE!"
VDU31,1 ,7
PRINT "Press any key";
G%=GET
GOTO start
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

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ONE and two letter variable names are interpreted by BBC Basic quickly and keep program size down, but they make a program hard to understand. Long variable names are easy to read, but may stop you from using the graphics mode that you want. With this utility you can have the best of both worlds.

It scans your program byte by byte and any variables, except resident integer variables such as *X%*, are replaced by a single lower-case letter variable name. Where there are more than 26 different variables then the substitution will be by two-letter variable names.

To make sure each variable is replaced correctly throughout your program a table of variables is kept at the end of the main body of machine code, labelled as *vartable* in the assembly code.

The replacement variable name is determined from the current variable's position in *vartable*, the first entry is replaced by *a*, the twenty-sixth by *z*, the twenty-seventh by *aa*, the twenty-eighth by *ab* and so on. A list of all variables found during a scan, together with their replacements, is given as the scan progresses.

There are places where possible variable names must not be compressed. Text inside quotes, operating system commands preceded by * and DATA statements are left unchanged.

If text that represents variables appears in DATA statements, as in the checksum routine in this program, then these will not be changed and will be incorrect.

A special problem arises when dealing with programs containing sections of assembly language. Unlike BBC Basic where keywords like PRINT are reduced to one byte, assembler mnemonics are not tokenised – for instance LDA remains unchanged.

Outside of assembler brackets LDA would be a correct variable name and would be shortened by the program. This must not happen inside assembler code.

To avoid this a special subroutine, *assembler*, is entered by the program when the opening square bracket of an assembler section is found.

Until the closing bracket is found all potential variables are checked on a table of assembler mnemonics and any matches are left unaltered.

The table of mnemonics covers all 6502 possibilities including EQUS, EQUB, EQUD, EQUW and the new Master series operations such as PLX and TRB.

As a bonus REM statements are deleted and multiple NEXT statements are shortened so that NEXT,, replaces NEXT *A,B,C*.

Spaces are removed, except where needed as shown in the following examples:

```
IF var>max max=var
```

The space between *max* and *max* is needed otherwise BBC Basic will believe a variable *maxmax* has been compared to *var* and an error will result.

```
IF var=&ABCD FLAG=TRUE
```

If the space between &ABCD and *FLAG* is removed the first letter of *FLAG* would be regarded as a hexadecimal digit leaving only *LAG* as the variable; an error may not occur but the program will not run correctly and you will have a very well hidden bug.

```
DIM array 100
```

This reserves 100 bytes of memory and puts the address of the first byte in *array*. The space between *array* and 100 is needed because *array100* is an acceptable variable name.

The program is complex and caters for most situations but there are a few where it fails. Firstly, in some assembler listings a remark after an assembler instruction does not start with \.

```
LDA #0      load accumulator with 0
```

The remark is not removed, but is corrupted by the utility. The target program would still run.

Secondly, Basic I requires instructions like OPT FNequs inside assembler to simulate the EQUB, EQUW and EQUS opcodes. The utility will leave FNequs unaltered because it recognises *equs* as an assembler instruction. Outside the assembler when DEF FNequs is defined *equs* would be treated as a variable and replaced.

This is easy to spot, as an error message will be generated when DEF FNequs cannot be found and is easily avoided by using a different name for the functions, for instance FNstring.

Thirdly, variables and labels which begin with an assembler mnemonic, for instance *start*, will only have the letters after the mnemonic replaced.

Normally the program will still run, unless the variable was defined outside the assembler, when a No such variable error will be given. Again this may be easily corrected.

The utility will work with any of Acorn's machines using the 6502, or its relatives, and with BBC Basic installed as the resident language. The machine code is set to execute at &7000; this would need to be changed for the Electron.

If the utility is run on its own source program, after debugging and removal of the checksum procedure, a 36 per cent saving in memory will be made.

You should note that your program is overwritten by the new version. Make sure you have a copy of the original on disc or tape before running the utility since any further program development or debugging is most easily done using the original.

→

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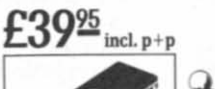

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CMS SOFT

MAIN PROCEDURES

assemble	The routine to assemble the utility's machine code.
readtable	Reads in mnemonics to table in machine code. It is important that the table is in the order given.
check	Provides checksums for blocks of machine code.

MAIN VARIABLES

base1	Pointer to start of current Basic line in the old version of the target program.
base2	As *base1* but for the new version.
shortname	The replacement variable for the current variable. If a two letter replacement is needed the second letter is stored in the *X* register.
varbase	Used as a pointer to the position of the variables listed in *vartable*.
memcopy	Location where potential mnemonics are stored while searching the table of mnemonics.
bottom, top, mid	Used as pointers when checking for mnemonics.

From Page 131

```
10 REM VARIABLE COMPRESSOR
20 REM By John Kelk
30 REM (c) The Micro User
40 MODE7:HIMEM=&7000
50 PROCassemble
60 PROCreadtable(66)
70 PROCcheck
80 END
90 DEFPROCassemble
100 oswrch=&FFEE:osnewl=&FFE7
110 osbyte=&FFF4
120 base1=&70:base2=&72
130 varlength=&74:shortname=&75
140 yold=&76:ynew=&77:flag=&78
150 varbase=&80:memcopy=&82
160 bottom=&8A:top=&8B:mid=&8C
170 FOR pass=0 TO 2 STEP 2
180 P%=&7000
190 [OPT pass
200 .main
210 JSR clearbuffer
220 LDA &18:STA base1+1:STA base2+1
230 LDY #0:STY base1:STY base2
240 INY:STY ynew
250 LDA (base1),Y
260 .loop1
270 JSR basicline
280 CMP #&80:BCC loop1
290 JSR update
300 RTS
310 .basicline
320 JSR update:JSR update
330 JSR update
340 .checkspaces
350 JSR nospaces
360 CMP #ASC":":BEQ nocolon
370 JMP testend
380 .nocolon
390 INY:LDA (base1),Y
400 JMP checkspaces
410 .code
420 CMP #65:BCC testspace
430 CMP #91:BCC var
440 CMP #95:BCC testassembler
450 CMP #123:BCS testnext
460 .var
470 JSR varlist:JMP testend
480 .testspace
490 CMP #32:BNE teststring
500 INY:LDA (base1),Y:JMP testend
510 .teststring
520 CMP #34:BNE testnumber
530 JSR string:JMP testend
540 .testnumber
550 CMP #48:BCC testhex
560 CMP #58:BCS carryon
570 JSR number:JMP testend
580 .testhex
590 CMP #ASC"&":BNE teststar
600 JSR hex:JMP testend
610 .teststar
620 CMP #ASC"*":BNE carryon
630 JSR checkos:BNE carryon
640 JMP wholeline
650 .testnext
660 CMP #&ED:BNE testdata
670 JSR next:JMP testend
680 .testdata
690 CMP #&DC:BNE testrem
700 JMP data
710 .testrem
720 CMP #&F4:BNE testlinetoken
730 JSR rem:JMP testend
740 .testlinetoken
750 CMP #&8D:BNE carryon
760 JSR update:JSR update
770 JSR update:JSR update
780 JMP testend
790 .testassembler
800 CMP #ASC"[":BNE carryon
810 JSR assembler:JMP testend
820 .carryon
830 JSR update
840 .testend
850 CMP #13:BEQ lineincrement
860 JMP code
870 .data
880 JSR update
890 JSR nospaces
900 .wholeline
910 JSR update
920 CMP #13:BNE wholeline
930 .lineincrement
940 TYA
950 CLC:ADC base1:STA base1:BCC L1
960 INC base1+1
970 .L1
980 LDY ynew:CPY #4:BEQ L2
990 TYA:LDY #3
1000 STA (base2),Y
1010 CLC:ADC base2:STA base2:BCC L2
1020 INC base2+1
1030 .L2
1040 LDA #13:LDY #0:STY ynew
1050 .update
1060 INY:STY yold:LDY ynew
1070 STA (base2),Y
1080 INY:STY ynew:LDY yold
1090 LDA (base1),Y
1100 RTS
1110 .string
1120 JSR update
1130 CMP #34:BEQ update
1140 CMP #13:BNE string
1150 RTS
1160 .nospaces
1170 CMP #32:BNE endspaces
1180 INY:LDA (base1),Y:JMP nospaces
1190 .endspaces
1200 RTS
1210 .next
1220 JSR update
```

→

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```
1230 .morenext
1240 CMP #ASC",":BEQ next
1250 CMP #ASC":":BEQ endnext
1260 CMP #13    :BEQ endnext
1270 INY:LDA (base1),Y
1280 JMP morenext
1290 .endnext
1300 RTS
1310 .rem
1320 INY:LDA (base1),Y
1330 CMP #13:BNE rem
1340 RTS
1350 .checkos
1360 STA flag:STY yold:LDY ynew
1370 CPY #4:BEQ endcheckos
1380 DEY:LDA (base2),Y
1390 CMP #58:BEQ endcheckos
1400 CMP #139:BEQ endcheckos
1410 CMP #140:BEQ endcheckos
1420 INC flag
1430 .endcheckos
1440 LDY yold:LDA #ASC"+"
1450 LDA #ASC"+":CMP flag
1460 RTS
1470 .varlist
1480 LDX #0
1490 .morevar
1500 STA varbuffer,X
1510 INX:INY
1520 LDA (base1),Y
1530 CMP #48:BCC endvar
1540 CMP #58:BCC morevar
1550 CMP #65:BCC endvar
1560 CMP #91:BCC morevar
1570 CMP #95:BCC endvar
1580 CMP #123:BCC morevar
1590 .endvar
1600 CPX #1:BNE findplace
1610 DEY:LDA (base1),Y
1620 CMP #91:BCC leavealone
1630 INY
1640 .findplace
1650 JSR lookupvar
1660 JMP endhex
1670 .leavealone
1680 JSR update:JMP endhex
1690 .lookupvar
1700 STY yold:STX varlength
1710 LDA #vartable MOD256
1720 STA varbase
1730 LDA #vartable DIV256
1740 STA varbase+1
1750 LDX #ASC"a"-1:STX shortname
1760 .nextentry
1770 LDY #0:INX
1780 CPX #ASC"(":BNE noinc
1790 LDX #ASC"a":INC shortname
1800 .noinc
1810 LDA (varbase),Y:BEQ emptyslot
1820 STA setnextentry+1
1830 CMP varlength:BEQ trymatch
1840 .setnextentry
1850 LDA #0
1860 SEC:ADC varbase:STA varbase
1870 INC varbase+1:BCS nextentry
1880 .trymatch
1890 TAY
1900 .loop2
1910 LDA (varbase),Y
1920 CMP varbuffer-1,Y
1930 BNE setnextentry
1940 DEY:BNE loop2
1950 JSR newname:JMP endlookupvar
1960 .emptyslot
1970 LDA varlength:STA (varbase),Y
1980 .loop3
1990 INY
2000 LDA varbuffer-1,Y
2010 STA (varbase),Y
2020 JSR oswrch
2030 CPY varlength:BNE loop3
2040 JSR newname:JSR printnewname
2050 JSR osnewl
2060 .endlookupvar
2070 LDY yold:LDA (base1),Y
2080 RTS
2090 .newname
2100 LDA shortname
2110 LDY ynew
2120 CMP #ASC"a":BCC justone
2130 STA (base2),Y:INY
2140 .justone
2150 TXA
2160 STA (base2),Y
2170 INY:STY ynew
2180 RTS
2190 .printnewname
2200 STX single+1
2210 LDA #134:JSR osbyte
2220 LDA #31 :JSR oswrch
2230 LDA #35 :JSR oswrch
2240 TYA     :JSR oswrch
2250 LDA shortname
2260 CMP #ASC"a":BCC single
2270 JSR oswrch
2280 .single
2290 LDA #0:JSR oswrch
2300 RTS
2310 .assembler
2320 JSR update:JSR nospaces
2330 JSR testend2
2340 .loop4
2350 JSR assline
2360 CMP #ASC"]":BNE loop4
2370 JMP update
2380 .assline
2390 JSR update:JSR update
2400 JSR update
2410 .checkspaces2
2420 JSR nospaces
2430 CMP #ASC":":BEQ nocolon2
2440 JMP testend2
2450 .nocolon2
2460 INY:LDA (base1),Y
2470 JMP checkspaces2
2480 .code2
2490 CMP #65:BCC testspace2
2500 CMP #91:BCC var2
2510 CMP #95:BCC testrem2
2520 CMP #123:BCS testORA
2530 .var2
2540 JSR memcheck:JMP testend2
2550 .testspace2
2560 CMP #32:BNE teststring2
2570 INY:LDA (base1),Y
2580 JMP testend2
2590 .teststring2
2600 CMP #34:BNE testnumber2
2610 JSR string:JMP testend2
2620 .testnumber2
2630 CMP #48:BCC testhex2
2640 CMP #58:BCS carryon2
2650 JSR number:JMP testend2
2660 .testhex2
2670 CMP #38:BNE carryon2
2680 JSR hex:JMP testend2
2690 .testrem2
2700 CMP #ASC"\":BNE testendass
2710 JSR remassembly:JMP testend2
2720 .testendass
2730 CMP #ASC"]":BNE carryon2
2740 RTS
2750 .testORA
2760 CMP #&84:BNE carryon2
2770 JSR update
2780 CMP #ASC"A":BNE carryon2
2790 JSR update:JMP testend2
2800 .carryon2
2810 JSR update
2820 .testend2
2830 CMP #13:BNE code2
2840 JMP lineincrement
2850 .remassembly
2860 INY:LDA(base1),Y
2870 CMP #13:BEQ endremass
2880 CMP #ASC":":BNE remassembly
2890 .endremass
2900 RTS
2910 .memcheck
2920 LDX #0
2930 .morevar2
2940 STA varbuffer,X
2950 INY:INX
2960 CPX #3:BNE morevar3
```

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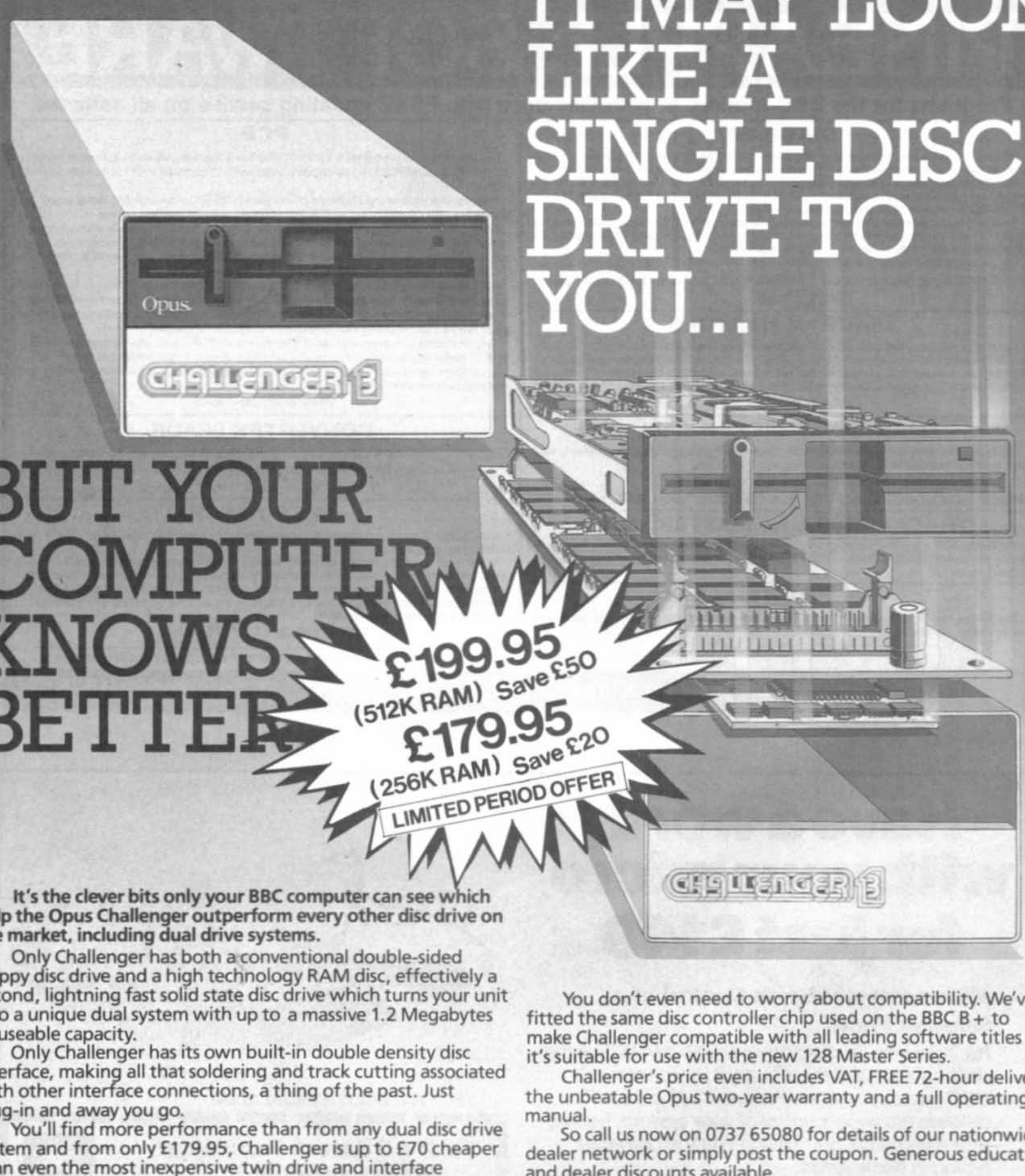

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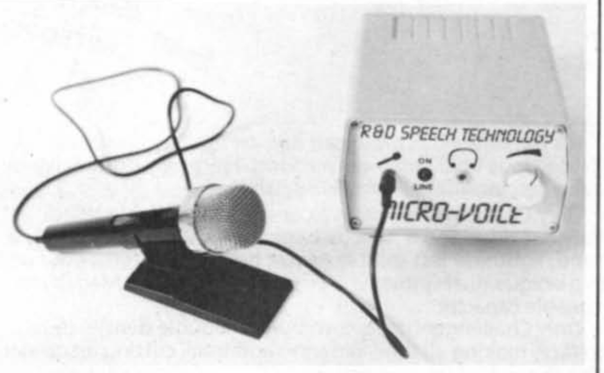

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From Page 134

```
2970 JSR mnemonic:BNE morevar3
2980 LDA (base1),Y:RTS
2990 .morevar3
3000 LDA (base1),Y
3010 CMP #48:BCC endvar2
3020 CMP #58:BCC morevar2
3030 CMP #65:BCC endvar2
3040 CMP #91:BCC morevar2
3050 CMP #95:BCC endvar2
3060 CMP #123:BCC morevar2
3070 .endvar2
3080 CPX #1:BNE findplace2
3090 DEY:LDA (base1),Y
3100 CMP #91:BCC leavealone2
3110 INY
3120 .findplace2
3130 JSR lookupvar
3140 JMP endhex
3150 .leavealone2
3160 JSR update:JMP endhex
3170 .mnemonic
3180 STY yold
3190 .loop5
3200 LDA varbuffer-1,X
3210 CMP #97:BCC uppercase
3220 AND #&DF
3230 .uppercase
3240 STA memcopy-1,X
3250 DEX:BNE loop5
3260 LDA #1:STA bottom
3270 LDA #66:STA top
3280 .loop6
3290 LDA top:CMP bottom
3300 BCC notfound
3310 CLC:ADC bottom
3320 LSR A:STA mid
3330 ASL A:ADC mid:TAY:LDX #0
3340 .loop7
3350 LDA table-3,Y:CMP memcopy,X
3360 BNE keeplooking
3370 INY:INX:CPX #3:BNE loop7
3380 LDA mid:CMP #26:BNE found
3390 LDY yold
3400 LDA (base1),Y:STA memcopy,X
3410 INX
3420 CMP #97:BCC uppercase2
3430 AND #&DF
3440 .uppercase2
3450 CMP #ASC"S":BEQ founda
3460 CMP #ASC"B":BEQ founda
3470 CMP #ASC"W":BEQ founda
3480 CMP #ASC"D":BNE notfound
3490 .founda
3500 INY:STY yold
3510 .found
3520 STX xstore+1:LDX #0
3530 LDY ynew
3540 .loop8
3550 LDA memcopy,X:STA (base2),Y
3560 INY:INX
3570 .xstore
3580 CPX #0:BNE loop8
3590 STY ynew:LDY yold
3600 LDA #0
3610 RTS
3620 .keeplooking
3630 BCS smaller
3640 LDX mid:INX:STX bottom
3650 BNE loop6
3660 .smaller
3670 LDX mid:DEX:STX top:BNE loop6
3680 .notfound
3690 LDA #&FF:LDX #3:LDY yold
3700 RTS
3710 .number
3720 JSR update
3730 CMP #48:BCC endhex
3740 CMP #58:BCS endhex
3750 BCC number
3760 .hex
3770 JSR update
3780 CMP #48:BCC endhex
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
3790 CMP #58:BCC hex
3800 CMP #65:BCC endhex
3810 CMP #71:BCC hex
3820 .endhex
3830 JSR nospaces
3840 CMP #48:BCC ok
3850 CMP #58:BCC spaceneeded
3860 CMP #65:BCC ok
3870 CMP #91:BCC spaceneeded
3880 CMP #95:BCC ok
3890 CMP #123:BCS ok
3900 .spaceneeded
3910 STY yold:LDY ynew
3920 LDA #32:STA (base2),Y
3930 INY:STY ynew:LDY yold
3940 LDA (base1),Y
3950 .ok
3960 RTS
3970 .clearbuffer
3980 LDY #varbuffer MOD256
3990 LDA #varbuffer DIV256
4000 STA base1+1
4010 LDA #0:STA base1
4020 .loop9
4030 STA (base1),Y:INY:BNE loop9
4040 LDX base1+1:INX:STX base1+1
4050 CPX #&7C:BNE loop9
4060 RTS
4070 .table
4080 ]
4090 P%=P%+198
4100 [OPT pass
4110 .varbuffer
4120 ]
4130 P%=P%+50
4140 [OPT pass
4150 .vartable
4160 ]:NEXT
4170 ENDPROC
4180 DEFPROCreadtable(N%)
4190 LOCAL C%,A%
4200 RESTORE 4260
4210 A%=table
4220 FORC%=1TON%
4230 READ $A%:A%=A%+LEN($A%)
4240 NEXT
4250 ENDPROC
4260 DATAADC,AND,ASL.BCC,BCS,BEQ.BIT
4270 DATABMI,BNE,BPL,BRA,BRK,BVC,BVS
4280 DATACLC,CLD,CLI,CLV,CMP,CPX,CPY
4290 DATADEC,DEX,DEY,EOR,EQU,INC,INX
4300 DATAINY,JMP,JSR,LDA,LDX,LDY,LSR
4310 DATANOP,OPT,ORA,PHA,PHP.PHX,PHY
4320 DATAPLA,PLP,PLX,PLY,ROL,ROR,RTI
4330 DATARTS,SBC,SEC,SED,SEI.STA,STX
4340 DATASTY,STZ.TAX,TAY,TRB,TSB.TSX
4350 DATATXA,TXS,TYA
4360 DEF PROCcheck
4370 LOCAL A$,B$,A%,B%,C%,T%
4380 RESTORE 4510
4390 READ A$:A%=EVAL(A$)
4400 REPEAT
4410 READ B$:IF B$="*" GOTO 4490
4420 B%=EVAL(B$):T%=0
4430 FORJ%=A%TOB%-1:T%=T%+?J%:NEXT
4440 PRINT A$;" to ";B$;
4450 PRINTSPC(25-LEN(A$+B$));
4460 READ C%
4470 IF T%=C% PRINT"O.K." ELSE PRINT
"ERROR!"
4480 A$=B$:A%=B%
4490 UNTIL B$="*"
4500 ENDPROC
4510 DATA main,testhex,13322
4520 DATA data,10732
4530 DATA rem,13742
4540 DATA lookupvar,13704
4550 DATA newname,14438
4560 DATA assline,10029
4570 DATA remassembly,16208
4580 DATA mnemonic,10571
4590 DATA number,19357
4600 DATA table,13029
4610 DATA varbuffer,15149
4620 DATA *
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

From Page 47

```
  850 .next1
  860 LDA new:AND #7:CMP #7:BEQ botto
m2
  870 INC new:BNE next2:INC new+1:JMP
 next2
  880 .bottom2
  890 CLC:LDA new:ADC #&79:STA new:LD
A new+1:ADC #2:STA new+1
  900 .next2
  910 DEC temprows:BNE loop2  \next r
ow
  920 CLC:LDA temp1:ADC #8:STA new:ST
A temp1:LDA temp1+1:ADC #0:STA new+1:
STA temp1+1
  930 LDA temp:ADC #8:STA old:STA tem
p:LDA temp+1:ADC #0:STA old+1:STA tem
p+1
  940 DEC columns:BNE loop1  \next co
lumn
  950 RTS
  960
  970 .data  \character data
  980 OPT FNequw(&C00)
  990
 1000 .convert  \X,Y->address in new
 1010 LDA #0:STA new+1:TXA:ASL A:ASL
A:ROL new+1:ASL A:ROL new+1:STA new \
X*8
 1020 TYA:AND #7:ADC new:STA new:LDA
new+1:ADC #0:STA new+1 \ +(Y MOD 8)
 1030 TYA:LSR A:LSR A:LSR A:ASL A:TAY
  \2*(Y DIV 8)
 1040 LDA table,Y:ADC new:STA new:LDA
 table+1,Y:ADC new+1:STA new+1
 1050 RTS
 1060
 1070 .table
 1080 OPT FNtable
 1090 ]
 1100 NEXT
 1110 ENDPROC
 1120
 1130 DEF FNtable
 1140 FOR I%=0 TO 31
 1150 ?P%=(&3000+I%*&280)MOD256
 1160 P%?1=(&3000+I%*&280)DIV256
 1170 P%=P%+2
 1180 NEXT
 1190 =pass
 1200
 1210 DEF FNequw(word)
 1220 ?P%=word MOD256
 1230 P%?1=word DIV256
 1240 P%=P%+2
 1250 =pass
 1260
 1270 DEF FNinkey(number)
 1280 [ OPT pass
 1290 LDA #&81
 1300 LDY #&FF
 1310 LDX #number+256
 1320 JSR osbyte
 1330 TYA
 1340 ]:=pass
 1350
 1360 DEF FNbumped
 1370 IF F% GOTO1460
 1380
 1390 REM PEEK Method
 1400 [OPT pass
 1410 LDY #0:LDA (address),Y
 1420 LDY #32:ORA (address),Y
 1430 RTS
 1440 ]:=pass
 1450
 1460 REM EOR Method
 1470 [OPT pass
 1480 LDA address:STA new:STA temp:LD
A address+1:STA new+1:STA temp+1 \new
+temp=address
 1490 LDA data:STA old:LDA data+1:STA
 old+1 \old points to sprite data
 1500 LDX #4:LDY #12  \size
 1510 STX columns:STY rows
 1520 LDY #0
 1530 .loop1
 1540 LDX rows
 1550 .loop2
 1560 LDA (old),Y:BEQ zero:EOR (new),
Y:BEQ zero:RTS
 1570 .zero
 1580 INC old:BNE n2:INC old+1  \next
 data byte
 1590 .n2
 1600 LDA new:AND #7:CMP #7:BEQ botro
w  \next screen byte
 1610 INC new:BNE n1:INC new+1:BNE n1
 1620 .botrow
 1630 CLC:LDA new:ADC #&79:STA new:LD
A new+1:ADC #2:STA new+1
 1640 .n1
 1650 DEX:BNE loop2  \next row
 1660 LDA temp:ADC #8:STA new:STA tem
p:LDA temp+1:ADC #0:STA new+1:STA tem
p+1
 1670 DEC columns:BNE loop1  \next co
lumn
 1680 RTS
 1690 ]:=pass
 1700
 1710 REM Ball data
 1720 REM columns=4/rows=12
 1730 DATA 0,1,1,3,15,7,7,15,3,1,1,0,
3,3,3,3,15,15,15,15,3,3,3,3,7,3,3,3,1
5,7,7,15,3,3,3,7,0,2,2,3,15,15,15,15,
3,2,2,0
```

This listing is included in this month's cassette tape offer. See order form on Page 159.

PROBLEM

I RECENTLY bought a Rediffusion system Alpha 14in colour monitor, for use with a BBC B. While mainly happy with it there appears to be a fault that no one can cure.

The fault is that very occasionally the left side of the screen is displayed on the right and vice versa. The display also goes very dim.

The fault only occurs when a new screen is displayed or a CLS or a change of mode – and as I said only occassionally.

The fault is cleared by cleaning the screen repeatedly – not guaranteed to work – or by switching the monitor off and on, which is guaranteed to work. – Doreen Edwards, Manchester.

SOLVED

When you change screen modes the line and frame syncronising signals are stopped and started again from the beginning. This means that the monitor has to re-syncronise itself.

What is happening is that your monitor is re-syncronising out of phase with the line sync pulses. This is definitely a fault in the sync circuits of your monitor.

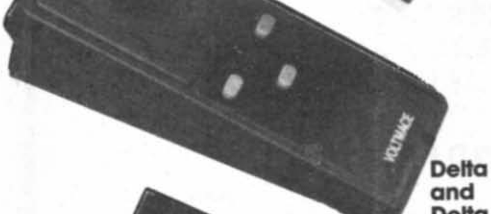
You could try adjusting the line sync control which you will find inside the set. If this is adjusted so that the natural line frequency is further away from the syncronising signals then maybe you will get better lock and this problem will not recur.

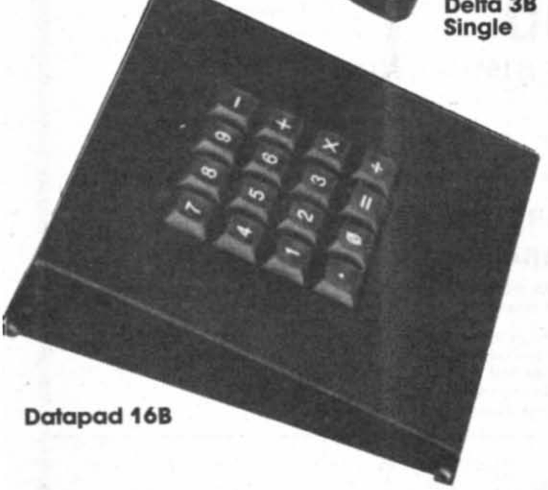
JOYSTICKS— THE COMPLETE SOLUTION

Delta 3B Twin

Delta 14B

Delta 14B/1


Delta 3S and Delta 3B Single


Datapad 16B

DELTA 3B TWIN–BBC B, MASTER or ELECTRON PLUS 1 £19.95
A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

DELTA 3B SINGLE–BBC B, MASTER or ELECTRON PLUS 1 £12.00
a single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

DELTA 14B–BC B, OR MASTER £14.95
Our orignal ACORN/BBC handset. The same super light joystick, but the long life buttons, which have been video game tested for many years, increased to 14 in number. A DELTA 14B/1 is needed to run the keypad but a 14B on its own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA14B/1 for use with 1 or 2 DELTA 14Bs £14.85
DELTA DRIVER CASSETTE £5.95
The A/D USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick port and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
Full instructions are provided to include the keypad in our own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

DELTA 3S–MASTER COMPACT (or ELECTRON fitted with switch joystick interface) £12.00
For the Compact, or if you have no Plus 1 on your Electron the 3S has the same delightful light, fast action as the Delta Analogue Joystick, but is fitted internally with switches and has a 9 way D plug.

FIRST BYTE switches joystick interface £19.95
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DELTA 3S JOYSTICK * FIRST BYTE INTERFACE TOGETHER £29.95

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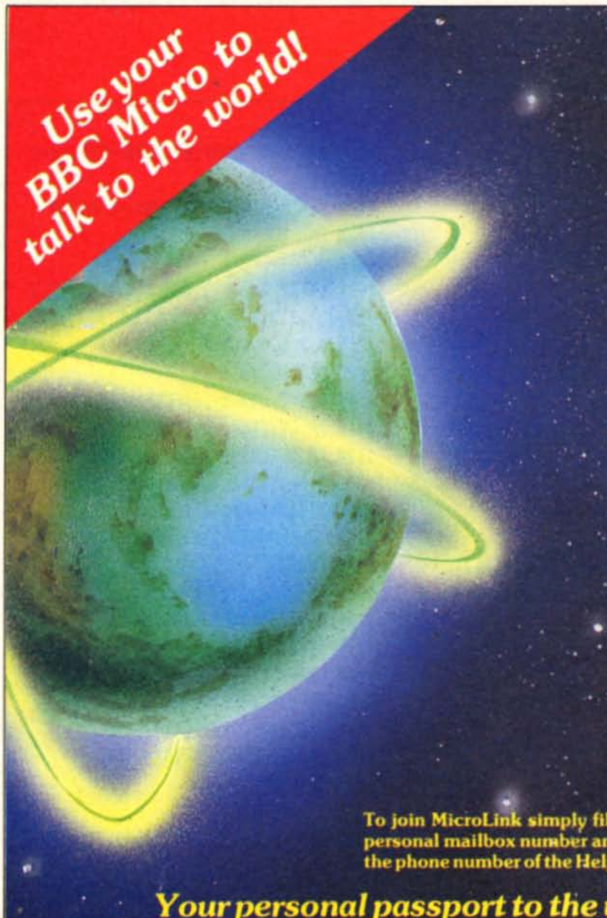
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```
  210 UNTIL PX%>1048 OR PX%<92 OR P=0
  220 IF P=1:FORT=1 TO20:PROCfair2:NE
XT
  230 PROCdel(1000):GOTO70
  240 DEFPROCsetup
  250 DIMA%(41),B$(10),C$(10),P$(1),U
%(4),V%(4),W%(4),M%(5),E%(1,1),H%(8),
H$(8)
  260 ENVELOPE1,1,-7,7,0,10,10,0,126,
0,0,-126,126,126
  270 ENVELOPE2,1,0,0,0,0,0,0,126,-1,
0,-3,126,126
  280 FORT=1TO8:H%(T)=1200+(9-T)*100:
H$(T)="MicroUser":NEXT
  290 FORT=0TO4
  300 U%(T)=((T+4)MOD5)*16
  310 V%(T)=((T+2)MOD5)*16
  320 W%(T)=((T+3)MOD5)*16
  330 NEXT:SC%=0:H%(0)=999999
  340 ENDPROC
  350 DEFPROCnew
  360 PROCscr:ST%=0:B%=70:PROCchar:VD
U5
  370 FORT=1TO10:MOVET*115,200:PRINTB
$(T):NEXT:PROCpchars:GCOL0,7:MOVE115,
280:PRINTP$(0):MOVE1008,280:PRINTP$(1
)
  380 PP=0:IF SC%>H%(8) PROCchange:PP
=1
  390 VDU4:PRINTTAB(5,10);"HIGH SCORE
S"
  400 FORT=1TO8:PRINTTAB(2,T+12);T;"
";STRING$(9,".");TAB(4,T+12);H$(T);TA
B(14,T+12);H%(T):NEXT
  410 IF PP=1 PROCin
  420 COLOUR11:PRINTTAB(5,23);SPC(10)
;TAB(7,23);"<SPACE>";TAB(7,24);"to pl
ay":REPEAT A=GET:UNTIL A=32
  430 SC%=0:ENDPROC
  440 DEFPROCchange
  450 FORT=7TO0 STEP-1:IF SC%<H%(T):P
=T+1:T=0
  460 NEXT:IF P=8:GOTO480
  470 FORT=7TO P STEP-1:H%(T+1)=H%(T)
:H$(T+1)=H$(T):NEXT
  480 H%(P)=SC%:H$(P)=STRING$(9,"."):
ENDPROC
  490 DEFPROCin
  500 *FX15
  510 COLOUR11:PRINTTAB(5,23);"Enter
name":COLOUR7:PRINTTAB(4,P+12);:*FX15
,0
  520 !&D00=&20090A00:?&D04=127:X%=0:
Y%=&D:A%=0:CALL&FFF1:H$(P)=LEFT$($&A0
0,9)
  530 ENDPROC
  540 DEFPROCdel(TT%)
  550 FORT=1TOTT%:NEXT
  560 ENDPROC
  570 DEFPROCcode
  580 FORT=0TO2 STEP2:P%=&B00
  590 [OPTT
  600 .start LDX#74
  610 .loop LDY#8
  620 .loop2 LDA(&70),Y:STA(&72),Y
  630 DEY:BNEloop2:LDA&70:STA&72:LDA&
71
  640 STA&73:LDA&80:BNEadd:LDA&70:SEC
  650 SBC#8:STA&70:LDA&71:SBC#0:STA&7
1
  660 DEX:BNEloop:RTS
  670 .add
  680 LDA&70:CLC:ADC#8:STA&70:LDA&71
  690 ADC#0:STA&71:DEX:BNEloop:RTS:]
  700 NEXT:ENDPROC
  710 :
  720 DEFPROCfair
  730 IF flag=1 AND BY%>510:VDU5:MOVE
BX%,BY%:PRINTS$
  740 IF T% MOD5=1:PROCp1
  750 IF T% MOD5=2:PROCp2
  760 IF T% MOD5=3:PROCp3
  770 PROCrot(0,&4657464F)
  780 PROCrot(0,&5557554F)
  790 PROCrot(1,&4BAF4BB7)
  800 IF flag=1 AND BY%>510:MOVEBX%,B
Y%:PRINTS$
  810 ENDPROC
  820 DEFPROCrot(p%,a%)
  830 ?&80=p%:!&70=a%:CALLstart
  840 !&70=a%+&2800280:CALLstart:ENDP
ROC
  850 DEFPROCchar
  860 RESTORE2500
  870 FORT=224TO250:VDU23,T:FORU=1TO8
:READV$:VDUEVAL("&"+V$):NEXT:NEXT
  880 A$=CHR$8+CHR$10:B$=CHR$18+CHR$0
  890 FORT=1TO10
  900 B$(T)=CHR$(T*2+222)+A$+CHR$(T*2
+223)
  910 NEXT
  920 B$(1)=B$+CHR$3+B$(1)
  930 B$(2)=B$+CHR$6+B$(2)
  940 B$(3)=B$+CHR$1+B$(3)
  950 B$(9)=B$+CHR$2+B$(9)
  960 B$(10)=B$+CHR$2+B$(10)
  970 FORT=4TO8
  980 B$(T)=B$+CHR$5+B$(T)
  990 NEXT
 1000 C$(1)=B$+CHR$3+CHR$244+A$+CHR$2
45
 1010 C$(2)=B$+CHR$6+CHR$246+A$+CHR$2
47
 1020 FORT=3TO10:C$(T)=B$(T):NEXT
 1030 G$=CHR$18+CHR$3+CHR$1+CHR$248+A
$+CHR$249
 1040 H$=CHR$9+CHR$127+CHR$9+CHR$10+C
HR$127
 1050 S$=CHR$18+CHR$3+CHR$1+CHR$250
 1060 ENDPROC
 1070 :
 1080 DATA2,3,2,1,3,8,3,1,2,3,2,1,7,2
,3,3,2,4,3,2,1,3,2,3,3,1,2,5,2,3,2,3,
1,2,3,6,2,3,9,3,2,2
 1090 DEFPROCp1
 1100 RN%=0:C%=C%-1:IFC%=-1:C%=41
 1110 IF A%(C%)=1:PROCnbull(-10)
 1120 IF A%(C%)=0:RN%=RND(35):IF RN%<
2+ST%/2:A%(C%)=1:hit=hit-1:ELSE IF RN
%=25:A%(C%)=8+RND(2):hit=hit-1
 1130 VDU5:MOVE64,766:PRINTB$(A%(C%))
 1140 ENDPROC
 1150 DEFPROCp2
 1160 VDU5:D%=C%:MOVE80,574
 1170 PRINTB$(A%((C%+28)MOD42))
 1180 ENDPROC
 1190 DEFPROCp3
 1200 VDU5:E%=C%:MOVE1152,670
 1210 PRINTC$(A%((C%+14)MOD42))
 1220 ENDPROC
 1230 DEFPROCscr
 1240 CLS:GCOL0,3:MOVE64,100:DRAW1216
,100
 1250 MOVE64,825:DRAW380,825:DRAW380,
1000:MOVE1216,825:DRAW896,825:DRAW896
,1000
 1260 VDU5:MOVE476,974:GCOL0,1:PRINT"
RONDO":MOVE492,966:GCOL0,3:PRINT"ROND
O"
 1270 COLOUR3:VDU4:PRINTTAB(6,4);"HI:
00000";TAB(6,5);"SC:00000";TAB(14-LEN
(STR$(H%(1))),4);H%(1):PROCsc
 1280 GCOL0,1:FORT=1TO70:MOVE24+T*16,
66:VDU250:NEXT
 1290 ENDPROC
 1300 DEFPROCanim
 1310 FORT=0TO1040 STEP80
 1320 MOVET+64,766:PRINTB$(A%(T/80))
 1330 MOVET+144,670:PRINTC$(A%(27-T/8
0))
 1340 MOVET+64,574:PRINTB$(A%(T/80+28
)):NEXT
 1350 MOVE640,170:PRINTG$
 1360 PROCnbon(0):PROCnbon(1)
 1370 ENDPROC
 1380 DEFPROCset
 1390 B%=70:T%=0:C%=1:X%=640:P=0:BY%=
0
 1400 hit=0:bon%=0:no%=0:M%(0)=3:flag
=0
 1410 h%=0:RESTORE1080
 1420 FORT=0TO41:READA%(T):NEXT
 1430 ENDPROC
 1440 DEFPROCman
 1450 F%=X%:X%=X%-(32-h%)*INKEY-67+(3
2-h%)*INKEY-98
 1460 IFX%=F%:ENDPROC
 1470 IFX%<64:X%=64
 1480 IFX%>1170:X%=1170
 1490 VDU5:MOVEF%.170:PRINTG$
 1500 MOVEX%,170:PRINTG$:ENDPROC
 1510 DEFPROCbullet
 1520 IF flag=1:PROCbmove:ENDPROC
 1530 IF INKEY-74:flag=1:SOUND0,-15,4
,2:BX%=X%:ELSE ENDPROC
 1540 BY%=170:VDU5:MOVEBX%,BY%:PRINTS
$
 1550 IF P=1:ENDPROC
 1560 PROCnbull(-1)
 1570 ENDPROC
 1580 DEFPROCbmove
 1590 VDU5:MOVEBX%,BY%:PRINTS$
 1600 BY%=BY%+64:PROCcheck
 1610 MOVEBX%,BY%:PRINTS$
 1620 ENDPROC
 1630 DEFPROCnbull(D%)
 1640 VDU5:IF D%=0:ENDPROC
 1650 IF D%<0:B%=B%+D%:MOVE256+B%*16,
66:VDU127,127,127:ENDPROC
 1660 FORT=1TO D%:MOVE24+(B%+T)*16,66
:VDU250:NEXT:B%=B%+D%:ENDPROC
 1670 DEFPROCcheck
 1680 IF BY%>810:flag=0:BY%=-1:PROCex
tra:ENDPROC
 1690 IF P=1:PROCpcheck:ENDPROC
 1700 P%=POINT(BX%+32,BY%+4)+POINT(BX
%+32,BY%+8)+POINT(BX%+24,BY%+4):IFP%>
0 PROChit
 1710 ENDPROC
 1720 DEFPROCextra
 1730 IFP=1:ENDPROC
 1740 IF BX%>380 AND BX%<896:ENDPROC
 1750 IF BX%<380:SC%=SC%+E%(0,0):PROC
sc:PROCnbull(E%(0,1)):PROCnbon(0):END
PROC
 1760 SC%=SC%+E%(1,0):PROCsc:PROCnbul
l(E%(1,1)):PROCnbon(1):ENDPROC
 1770 DEFPROChit
 1780 hit=hit+1:J%=T% MOD5:VDU5
 1790 SOUND0,2,6,4
 1800 IF BY%=522 OR BY%=554:j%=1
 1810 IF BY%=618 OR BY%=650:j%=2
 1820 IF BY%=714 OR BY%=746:j%=3
 1830 ON j% GOSUB1860,1900,1940
 1840 flag=0:BY%=-1:A%(R%)=0:PRINTH$
 1850 ENDPROC
 1860 I%=(BX%-40-W%(J%))DIV80
 1870 R%=(D%+28+I%)MOD42:PROCadd
 1880 MOVEI%*80+W%(J%)+88,574
 1890 RETURN
 1900 I%=(1192-BX%-V%(J%))DIV80
 1910 R%=(E%+14+I%)MOD42:PROCadd
 1920 MOVE1144-I%*80-V%(J%),670
 1930 RETURN
 1940 I%=(BX%-24-U%(J%))DIV80
 1950 R%=(C%+I%)MOD42:PROCadd
 1960 MOVEI%*80+U%(J%)+88,766
 1970 RETURN
 1980 DEFPROCnbon(M%)
 1990 VDU4:PRINTTAB(1+M%*14,3);SPC(4)
 2000 NE%=RND(2):IF NE%=1:PRINTTAB(1+
M%*14,3);"+":ELSE PRINTTAB(1+M%*14,3)
;"-"
 2010 E%(M%,0)=0:E%(M%,1)=0
 2020 IF NE%=2:NE%=-1
 2030 IF RND(2)=1:E%(M%,0)=RND(10)*10
*NE%:PRINTTAB(2+M%*14,3);ABS(E%(M%,0)
):ENDPROC
 2040 VDU5:GCOL0,1:E%(M%,1)=(RND(6)+4
)*NE%:FORT=1TO ABS(E%(M%,1)):MOVE99+T
*16+M%*896,916:VDU250:NEXT:ENDPROC
 2050 DEFPROCadd
 2060 K%=A%(R%)
 2070 IF K%<4:SC%=SC%+20:PROCsc:ENDPR
OC
 2080 IF K%>3 AND K%<9:PROCbonus:ENDP
ROC
 2090 IF K%=9:PROCnbull(5):ELSE PROCn
bull(10)
 2100 ENDPROC
 2110 DEFPROCsc
 2120 VDU4:PRINTTAB(14-LEN(STR$(SC%))
,5);SC%:VDU5:ENDPROC
 2130 DEFPROCbonus
 2140 IF no%=1:ENDPROC
 2150 bon%=bon%+1:M%(bon%)=K%:IF (M%(
bon%)-1)<>M%(bon%-1):no%=1
 2160 IF bon%=5 AND no%=0:SOUND1,1,13
6,15:SC%=SC%+500:PROCsc
 2170 ENDPROC
 2180 DEFPROCpchars
 2190 RESTORE2540
 2200 FORT=224TO233:VDU23,T:FORU=1TO8
:READV$:VDUEVAL("&"+V$):NEXT:NEXT
 2210 P$(1)=CHR$224+CHR$225+CHR$226+C
HR$8+CHR$8+CHR$10+CHR$227+CHR$228
 2220 P$(0)=CHR$231+CHR$230+CHR$229+C
HR$8+CHR$8+CHR$8+CHR$10+CHR$233+CHR$2
32
 2230 ENDPROC
 2240 DEFPROCpscr
 2250 VDU4,28,0,31,19,8,12,26,5
 2260 GCOL0,3:MOVE64,100:DRAW1216,100
 2270 MOVE300,574:GCOL0,7:PRINTP$(0)
 2280 MOVE640,170:PRINTG$
 2290 px=1:PX%=300:P=1:X%=640:h%=0
 2300 ENDPROC
 2310 DEFPROCfair2
 2320 PX%=PX%+px*16
 2330 IF flag=1 AND BY%>510:VDU5:MOVE
BX%,BY%:PRINTS$
 2340 IFpx=1:PROCrot(0,&5557554F)
 2350 IFpx=-1:PROCrot(1,&532F5337)
 2360 IF flag=1 AND BY%>510:VDU5:MOVE
BX%,BY%:PRINTS$
 2370 ENDPROC
 2380 DEFPROCpcheck
 2390 IF BY%<522 OR BY%>554 ENDPROC
 2400 IF BY%=554:IF BX%>PX%-8 AND BX%
<PX%+152:PROCphit
 2410 IF BY%=552:IF BX%>PX%-px*32 AND
 BX%<PX%-px*32+128:PROCphit
 2420 ENDPROC
 2430 DEFPROCphit
 2440 h%=h%+2:SOUND0,2,6,4
 2450 MOVEPX%+192,574:VDU5,127,127,12
7:MOVEPX%+192,542:VDU127,127,127
 2460 IF px=1 AND ABS(BX%-PX%-40)<8:G
OTO 2490
 2470 IF px=-1 AND ABS(BX%-PX%-104)<8
:GOTO 2490
 2480 flag=0:px=-px:MOVEPX%,574:GCOL0
,7:PRINTP$((px+2)MOD3):ENDPROC
 2490 VDU4:PRINTTAB(6,13);"BONUS ";ST
%*100+500:SC%=SC%+ST%*100+500:PROCsc:
P=0:ENDPROC
 2500 DATA0,38,6C,6E,7C,38,1C,3E,3E,7
E,7E,7E,7C,78,50,18,20,20,78,6C,6C,7C
,30,38,78,7C,7C,7C,7C,78,30,38,24,24,
7E,5A,5A,7E,24,3C,7E,7E,7E,7E,7E,5A,3
C,24,0,0,0,78,7C,44,4C,78,78,4C,44,7C
,78,0,0,0
 2510 DATA0,0,0,38,7C,44,44,44,44,44,
44,7C,38,0,0,0,0,0,0,44,44,64,74,54,5
4,5C,4C,44,44,0,0,0,0,0,0,44,44,44,44
,44,44,44,44,7C,38,0,0,0,0,0,0,3C,7C,
40,40,78,3C,4,4,7C,78,0,0,0
 2520 DATA0,0,0,7C,0,7C,40,7C,4,4,7C,
0,7C,0,0,0,0,0,0,7C,0,5C,54,54,54,54,
5C,0,7C,0,0,0,0,1C,36,76,3E,1C,38,7C,
7C,7E,7E,7E,3E,1E,A,18,4,4,1E,36,36,1
E,C,1C,1E,3E,3E,3E,1E,1E,C,1C,0,0,0,0
,10,10,10,10,10,38,38,28,6C,7C,C6,82
 2530 DATA10,10,10,10,0,0,0,0
 2540 DATA0,0,F,1C,16,3F,3F,1C,3F,FF,
FC,FB,F6,F5,F5,F5,E0,F0,18,EC,36,D6,5
6,D6,76,3B,3C,3F,3B,38,F8,F8,36,EE,1E
,FE,3C,1C,7C,7C,0,0,F0,38,68,FC,FC,38
,FC,FF
 2550 DATA3F,DF,6F,AF,AF,AF,7,F,18,37
,6C,6B,6A,6B,6E,DC,3C,FC,1C,1C,1F,1F,
6C,77,7B,7F,3C,3B,3E,3E
 2560 *KEY0FORI%=0TOTOP-PAGE STEP4::I
%!&E00=I%!PAGE:N.|MPAGE=&E00|MOLD|MRU
N|M
 2570 *FX138,0,128
```

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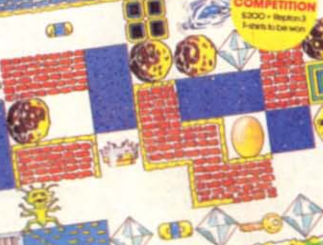

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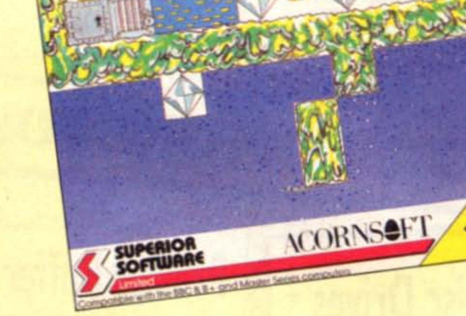

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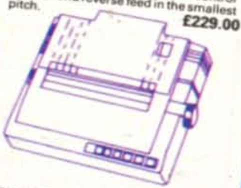

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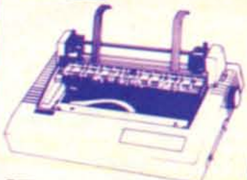

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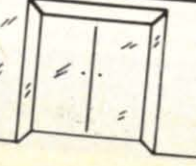

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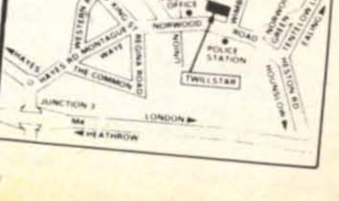

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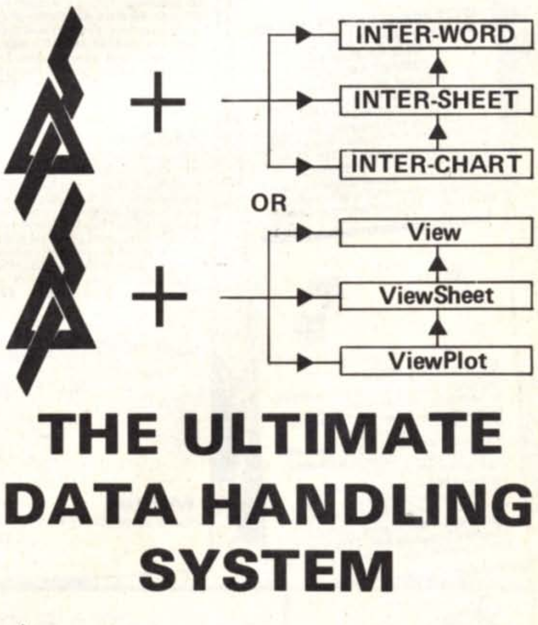

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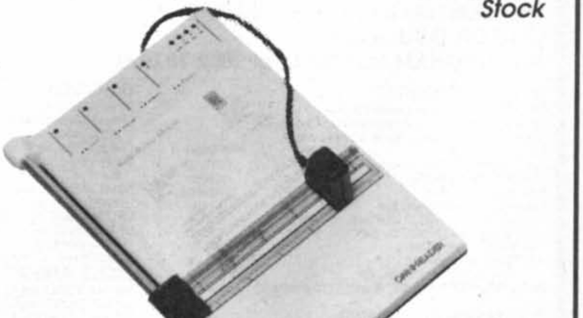

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NEWSLETTER

For sale

PEOPLE at the Ford Motor Company have discovered a new "showroom" for selling their cars – MicroLink.

Bob Hancox, a process engineer at Ford's Dagenham plant, used MicroLink to advertise his own Y registration Fiesta when he recently moved to a job which qualified him for a company car.

He knows all about the system's speed and efficiency through his regular telex and telemessage contacts with other engineers in the US and Europe.

And Bob is also familiar with MicroLink's ability to reach a wide audience, having previously used the bulletin board to successfully advertise a music centre and a camera.

After swiftly disposing of the £3,700 diamond white Fiesta XR2, Bob said: "MicroLink is the best system of its kind without a doubt".

Computers, comms and the clergy

CHURCH of Scotland minister Martin McKean's days are spent in the quiet old market town of Cumnock in the farming county of Ayrshire, an area which hasn't seen much excitement since the days of the Covenanters.

But in the evenings the world is his playground thanks to MicroLink.

"Computing has been my hobby and relaxation since schooldays", he said. "MicroLink lets me see what's going on elsewhere in the field of computer communications".

Martin has already had a good browse around the giant American database Mnematics which was coupled to the MicroLink system recently.

"I was disappointed at not finding a section on religion – it seemed to cover just about everything else", he said.

"I'd like to see a section on MicroLink for clergymen like myself to share news, views and ideas for sermons – and to discuss our shared interests in computers and communications.

"I am already communicating regularly with a Roman Catholic priest in Manchester via MicroLink and I'd be delighted to hear from other clergy on MAG 30319".

TELEX FOR KIPPERS

FOR five years the Shetland Smokehouse on the island of Skeld has been supplying salmon, Shetland lamb, silver eel – and of course kippers – to a mainly local market.

But a recent major expansion has boosted production, which means there's quantity as well as quality now to meet demand from the mainland.

Managing director David Hammond said: "As an expanding business entering new markets we have to be competitive.

"In business you have to get things down in black and white or risk making mistakes – the telephone just won't do.

"Letters take about five days and it's extremely difficult to get a dedicated telex line installed in an isolated place like Skeld.

"But with MicroLink we have immediate access to telex links with our clients and, as a bonus, an entry to all kinds of fascinating databases which could be useful for marketing purposes".

Shop electronic

MICROLINK has started yet another great consumer service for home computer owners.

Shop Window is Britain's latest, and could become the biggest, computerised shopping service – a convenient 24 hours a day, seven days a week electronic emporium.

It provides the opportunity to do your shopping without leaving the comfort of your fireside.

And while other teleshopping services restrict themselves to a limited range of products like groceries or household goods, there are no such constraints on Shop Window.

Although its initial catalogue of companies is mainly concerned with computer products it will grow to eventually include all manner of goods and services on a nationwide basis.

There are even classified "exchange and mart" type sections for bargain hunters.

And its motto from day one has been: "Top brands at lowest-ever prices".

On the road

AS RAC services manager for Yorkshire, Danny Finney covers the organisation's biggest geographical area – North Humberside, South and West and North Yorks and Cleveland.

His department is responsible for road patrols, directional and warning signs, motorway service centres, the RAC base garage and emergency control room.

Naturally he can use all the help he can get, which is where MicroLink comes in. Danny is using the system's electronic mail facility to tell Yorkshire folk all about the RAC's famous road sign service for special events.

These are the familiar blue-and-white pointers to the best routes for getting to and from everything, from the local church fete to the Lombard RAC Rally.

Danny wants everyone to know that signposting an event only costs on average £72 – even though it involves expert input from the RAC professionals, police and relevant local authority.

YOUR chance to join MicroLink – turn to Page 141

S.P.X.

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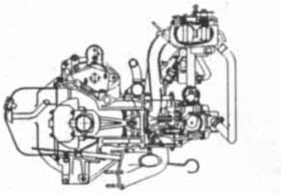

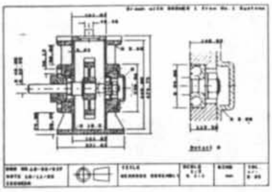

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Making the most of Wordwise Plus

I HAVE been playing around with the string variables in Wordwise Plus and have encountered a few points of interest.

More recent editions of the rom have a reduced memory for string variables. It used to be a total of 613 characters for all 26 (A$ – Z$); this has been reduced to 437 total as a result of improvements to other parts of the package (according to Computer Concepts) but the manual still says 613.

The manual also states that providing the total characters do not exceed the above limit, "any one string can hold a maximum of 255 characters".

What it does not say is that the string length is also subject to the method of creating it, so how many characters can we put in a string? The answer is 115 or 120 or 255 depending on how we do it. And it's quite a roundabout method to get the 255 character string.

In command mode, that is when the menu is displayed, if you type:

```
:A$="›xxxxxxxx ...
```

and so on, you find further input is prevented after 116 characters. In fact you have to delete one to be able to enter the closing quote mark.

Now try:

```
:A$=GLK$
```

You will now find that you are arrested at 120 characters. This also applies when this form is used in a segment program.

If you use a building procedure such as:

```
A$=""
REPEAT
L$=GCK$
A$=A$+L$
UNTIL FALSE OR L$=C.13
```

you will find that the program aborts at more than 252 characters.

The only way to enter a full 255 string is to use a spare segment and create a temporary file which is then read into a string variable. Try the following in any segement except nine.

```
SELECT SEGMENT 9
N%=0
REPEAT
N%=N%+1
L$=GCK$
P.L$;
TYPE L$;
UNTIL N%=255 OR L$=CHR$13
CURSOR TOP
A$=GLT$
P.A$
```

Of course if you put the UNTIL N% at a number higher than 255 then the extra character will be accepted in the temporary file but A$ will only accept the first 255.

Could you please advise me if it is possible to make an Epson compatible printer scroll backwards? I need to be able to print a paragraph and then a separate column of notes alongside.

To get this effect I usually have to program in a pause and manually rewind the paper. This is tedious if there are a lot of notes and it is inaccurate when several paragraphs and comments occur on one page.

It would be very nice if the printer could roll back to a predetermined line and also roll on if the new paragraph was not so long as the one alongside. – **Peter Noble, Old Glossop, Derbys.**

● The better Epson compatibles respond to ESC j (27,106), which scrolls the paper back by one line. But care has to be taken to ensure the paper does not jam.

Win a tenner

● **Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

Writers of the most interesting letters receive a £10 prize.

Star performance

THANK you for your program Star of the Command Performance *in the November issue of* The Micro User. *It does its job very well when used from my own Basic programs.*

But I ran into a problem using it from the word processor in Mini Office II. For instance when I try to print one single word in italics, the current print style is simply continued. But whole lines can be printed in italics.

It seems that the program accepts only one star command in one line, executing it for the whole line. Encountering more only executes the last one. Can anything be done about this? – **A. Kreuzen, The Netherlands.**

● Word processors that allow star commands treat them in different ways. Some only allow one on a line while others treat them as they appear between the text on a line. The performance of the Star Print utility is obviously affected by this.

Mini Office II allows more than one star command on a line and they are executed before the rest of the text has been printed. You can prove this by entering:

```
start f5 *. f6 Middle f5 *.
  f6 end
```

You will find the disc catalog

→

Santa with joystick

I HAVE typed in Santa's Sleigh and really enjoyed playing it. But I would like to ask how the joystick commands work. Is there a wait for joystick command? – **Tom Houston Jnr, Larkhall. Age 12**

● The operating system in the BBC Micro is very sophisticated and from the moment it is switched on it starts checking the analogue to digital converter port.

The ADVAL command is simply a request to the operating system saying "what is the current state of converter 1,2,3 or 4" or the fire buttons.

The reply is almost instantaneous so there is no waiting for the joystick to be moved.

Another feature of the BBC Micro is that it has proportional conversion. This means that with a joystick all the way to the left a number (approximately 65520) is returned by ADVAL(1).

If the joystick is centred then the number is around 32760, while at the far right you get a number near 0. And if your joystick is analogue all the numbers in between are generated depending on the position of the joystick.

ADVAL(2) gives the forward and back movement and ADVAL(0)AND3 detects the fire button. You can experiment with this by typing:

```
REPEAT PRINT ADVAL(1),ADVAL
(2),ADVAL(0)AND3:UNTIL 0
```

From Page 153

appears twice and the words appear together at the end.

Obviously this means that, for example, a *Italic would be cancelled by a *Reset on the same line and unfortunately we know of no way round this. Have any of our readers found a solution to this problem?

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Dangerous Challenge

THERE are a couple of dangers in Mortechs Eddie Kidds Jump Challenge. At the far right of the screen is a brick wall the same height as the bike, and as far as I can see it is endless and unclimbable.

But at the far left there is a viaduct over some water. Both of these appear on the first scene of the BMX and second scene of Motor Bike games.

You can ride up the viaduct, but not all the way across it. The way to do it is to face to the left and accelerate up to third or fourth gear. When you reach the trees raise the front wheel by leaning back and when you get to the viaduct up you go.

Does anyone know a way of judging wind speed and direction in this game? – **D. Breeze, Thornaby-on-Tees, Cleveland.**

Control characters

I HAVE just fitted Viewspell to my Model B, but although it works perfectly in drive 1, in drive 0 it will not save the text of a marked file. It only saves the title and No Text appears when you try to load it.

Acorn thought it was a faulty chip, but I am still having the same problem after replacing it.

Also, I would like to add the Ascii code for Control+N into a !BOOT file, to turn off automatic scrolling.

Could Rory McCloy please write an appendix to his excellent articles to say how this and the other control letters can be used?

Finally, I have an ATPL board fitted and two loose HM6264LP chips which I have not used yet as I have never seen a way of using them with View.

Would it be possible to load the Master dictionary into them and thereby speed up its operation? Also would there be enough memory free to include the User Dictionary? – **Peter Burrows, South Harrow, Middlesex.**

● Your problem could be an incompatibility with a Watford DFS. With this DFS I could not even load file into Viewspell without a bad filename error. When I substituted an Acorn DFS there were no problems and the text file could be used in drive 0.

You should contact Watford Electronics for further information. I have not had any problems with Viewspell using any version of the Acorn DFS, 1770 DFS or ADFS.

You can enter any control characters from the function keys using the appropriate codes. The codes generated by pressing Control+letter can be reproduced from the function keys by preceding the letter with the bar character (¦).

Thus the VDU code Control+N is programmed on to a function key by ¦N. The same applies to all the VDU codes and you will find them

Music while you work

I AM writing a game and I was wondering whether you could tell me how to keep music running throughout the game when you have worked out the pitch and duration?

I congratulate Mr. Key on Pendragon in the June 1986 issue of The Micro User. — **J. A. Silkins, Pevensey Bay, E. Sussex.**

● The simplest way in Basic is to call a procedure – PROCtune – regularly from your program and update the sound queues whenever there is space as shown in the following program.

```
  10 V%=-5:REP.PROCtune:U.0
8000 DEFPROCtune:LOCALP%,D%
8010 IF ADVAL-5=0 ENDPROC
8020 REPEAT READ P%,D%
8030 IFP%=-1 RES.:READP%,D%
8040 SOUND 1,V%,P%,D%
8050 UNTILADVAL-5=0:ENDPROC
9000 DATA 89,10,53,10
9010 DATA 117,10,-1,0
```

A better way is to use machine code and events to keep the music running. In the following program, you can use your own tune by replacing the DATA statements with the pitch/duration pairs of your data, ending with -1,-1.

The limit is 127 pairs and when at this limit one and a half pages of ram are required.

```
10 event=4:evntv=&220:cnpv=
&22E
20 oscli=&FFF7:osbyte=&FFF4
30 osword=&FFF1:C%=&B00:ptr
=&8F
40 FOR L%=0 TO 2 STEP 2
50 P%=C%:[OPT L%
60 .start SEI
70  LDX evntv:LDY evntv+1
80  STX oldv+1:STY oldv+2
90  LDX #myevent MOD256
100  LDY #myevent DIV256
110  STX evntv:STY evntv+1
120  CLI:LDA #14:LDX #event
130  LDY #0:STY ptr:JMP osb
yte
140 .myevent PHP
150  CMP #event:BNE exit1
160  PHA:TYA:PHA:TXA:PHA
170  LDX #5:SEC:CLV:JSR cnt
vec
180  TXA:BEQ exit
190 .read
200  LDX ptr:LDA tune,X
210  LDY tune+1,X:CPY #&FF
220  BNE play:INY
230  STY ptr:BEQ read
240 .play
250  INC ptr:INC ptr
260  STA snd+4:STY snd+6
270  LDX #snd MOD256
280  LDY #snd DIV256
290  LDA #7:JSR osword
300 .exit
310  PLA:TAX:PLA:TAY:PLA
320 .exit1 PLP:.oldv JMP &F
FFF
330 .cntvec JMP (cnpv)
340 .snd:]:!P%=1:P%!2=-5:P%
!4=0
350 P%=P%+8:[OPT0:.tune:]
360 NEXT:REPEAT READ T%,D%
370 !P%=T%:P%!1=D%:P%=P%+2
380 UNTIL D%=-1:X%=HIMEM-&1
00
390 $X%="S.tune "+STR$~C%+"
 "+STR$~P%
400 Y%=X%DIV256:CALL oscli:
END
410 DATA 97,10,105,10,89,10
420 DATA 41,10,69,40,-1,-1
```

summarised in the User Guide.

Unfortunately you cannot use the 16k ram on your Sideways ATPL board as a silicon disc to store and access normal files.

Even if you could, the length of the Viewspell master dictionary file is 178k, which is why it resides on a disc and not in an eprom. – *Rory McCloy*

Gilding the lily

£10 Prize letter

I NOW get more fun from Superior Software's Space Pilot. Apart from the normal 5 levels, there are 2 extra levels that you can only find out about if you press Break after you run the program and type:

```
PAGE=&2900
LIST 130
```

Change the FORW%=0TO4 at the start of the line to FORW%=5TO6. Tape users must now get the tape ready to load in PILOT4 and disc users just keep the disc in the drive. Now type RUN and the program should start to load.

Once loaded press the spacebar and the game will start. Don't worry if the title looks corrupted, the game will still work.

In this level you should get the huge planes flying around instead of the small ones. Every so often they will change into a different style of plane.

After completing this level you will go on to the second of the new levels. This time missile firing explosions will be flying around.

After a while these too will change, maybe into a parachutist or even missile firing missiles. I hope these tips will help people to get even more fun out of this great game. – **Neil Sumpter, Hoddesdon, Herts. Age 13.**

£10 Prize letter

Baffled by scrolling?

I KNOW many readers are baffled by hardware scrolling, which is controlled by the CRTC (Cathode Ray Tube Controller) or perhaps moving over 20,000 bytes which takes more than a second in machine code and more than a minute in Basic.

The CRTC has to access the screen memory 50 times a second so it would be nice if you could specify where the screen starts, and you can.

The screen is stored from &3000 to &7FFF, for Modes 0, 1, and 2. And it is arranged starting from the top left two pixels going down vertically for eight then back up and so on across and then down the screen.

More details of this can be found in the first article about 6502 machine code games in the February 1985 issue of The Micro User.

So by subtracting and adding 8 to the start address it will move left and right. Adding 640 will move the screen down and subtracting 640 will move it up.

In the CRTC, registers 12 and 13 are for the screen start address. Register 12 has START DIV 2048, register 13 has START MOD 2048 DIV 8.

To write to these registers you use:

```
VDU23;12,START DIV2048;0;0;0;
VDU23;13,START MOD2048 DIV8;0
;0;0;
```

The following is a program which prints a big sphere and bounces it round the screen.

```
 10 MODE1:S%=&3000:B%=648
 20 FORY%=210TO0STEP-60
 30 PROCell(640,512,Y%,210)
 40 PROCell(640,512,210,Y%)
 50 NEXT:F%=1:PROCb:END
 60 DEFPROCell(A%,B%,C%,D%)
 70 MOVEA%+C%*SINRAD0,B%+D%
*COSRAD0
 80 FOR T=RAD0 TO RAD360 ST
EP RAD15
 90 DRAW A%+C%*SINT,B%+D%*C
OST
100 NEXT:ENDPROC
110 DEFPROCb:REPEAT S%=S%-B
%
120 IF S%<&3000 S%=S%+&5000
:F%=2
130 IF S%>&8000 S%=S%-&5000
:F%=1
140 IF S%>&4000 IFF%=1 F%=0
:B%=B%+1280
150 IF S%<&7000 IFF%=2 F%=0
:B%=B%-1280
160 IF (S%-&2EC0)MOD640>500
 B%=B%+16
170 IF (S%-&2EC0)MOD640<100
 B%=B%-16
180 *FX19
190 VDU23;13,S%MOD2048DIV8;
0;0;0;
200 VDU23;12,S%DIV2048;0;0;
0;
210 UNTIL INKEY-1:ENDPROC
```

— **Paul Carpenter, Yate, Nr. Bristol. Age 12**

Previewing Wordwise

I HAVE a BBC Micro upgraded from a model A to B.

When I use Wordwise Plus or Wordwise and try to preview the text after approximately 1300 words have been typed in, the screen contents scroll continuously. Is there any way to prevent this? – **R. Chadwick, High Wycombe, Bucks.**

● The Wordwise word processors try to preview in Mode 3, which uses 16k of ram. But after your 1300 words there is insufficient room for the mode change, so the screen stays in Mode 7 and your text flashes by.

The only solution is to get a shadow screen add-on that is compatible with Wordwise Plus.

Hints for runners

I WOULD like to offer help on the new Strikers Run game from Superior Software. I bought the game a few weeks ago and have just about mastered it.

Map the screen so you can see how far you have to go, and also put the enemy aircraft on with the position they first appear to show where to fire.

When you are on foot fire and duck when the enemy first come on the screen. The best level to fly at is just above the mountains as this makes the fuel last a little longer.

When you arrive at a missile launcher don't try and fly over it as this results in the destruction of the aircraft in most cases. Instead land on the surface, bounce along and then climb back to mountain height. Each aircraft should reach the next but some don't.

When you are in an aircraft which only drops bombs try to fly underneath the enemy. They will detect you and start to bomb, but because you are underneath they bomb their own men saving you time and fuel. – **M. Robinson, Glenfield, Leicester.**

On-screen accents

I AM a student of the foreign languages French and German and I wish to be able to write essays using a word processor.

I have a BBC Model B, Wordwise Plus, disc drive and a green screen monitor.

Where can I buy software to give me WYSIWYG, including all accents and special characters on the monitor, and what printer, either daisywheel or dot-matrix, will this software drive? – **R.K. Quigg, Belfast.**

● To our knowledge there is no English language word processor that provides on-screen accents, and Interword and View are the only popular WYSIWYG word processors

→

From Page 155

available.

Most dot-matrix printers have selectable international character sets which can replace less used punctuation with accented characters.

This means that, for example, if you type left curly bracket on your BBC Micro, you get e-acute in French mode, and a-umlaut in German mode on your printer.

Check to make sure the printer you buy can do this.

Basic corruption

WILL you please explain what the error message Bad program actually means in a program and how it can be avoided.

I know that

```
!TOP=&FF0D
```

will sometimes recover most of the program, but is there some way I can find out where the fault lies?

I have typed in a program from a magazine which uses a lot of machine code. When I run it, I always get Bad program and I don't know why.

– C. Higgins, Nottingham.

● Bad Program is caused by corruption of Basic lines in a program.

In memory each line starts with a Return (&0D) followed by the line number in two bytes and the length of the line in one byte. The end of the program is marked by the two bytes &0D and &FF.

If any of these are corrupted then Basic will reject the program when it checks validity, after OLD or LIST.

If machine code overwrites a Basic program it will become Bad and usually can't be recovered. This will happen if the value of *P%* in any assembly code is between PAGE and TOP.

When Bad program is reported TOP is set at the start of the line where the corruption has first occurred. This means that if you make this the end of the program with

```
!TOP=&FF0D
```

your program up to that point should be recovered.

Divide and rule

I AM currently doing a project on my BBC B Micro involving turning analogue digital conversion results into a number between 0 and 16.

However, this involves dividing the conversion result by 2220. Since this number is not a multiple of two I have been unable to code the calculation.

I would be very grateful if you could explain how this calculation is performed. Also could you please tell me where the analogue to digital conversion result is placed in memory?

– J. Bishop, via MicroLink.

● The ADC returns an 8 or 10 bit number which is multiplied by the MOS to produce a 16 bit value. To convert this to a number between 0 and 15, division by 4096 is accurate enough.

From machine code osbyte 128 call returns the high byte of the value in the Y register and this can be easily chopped down to four bits giving a number from 0 to 15.

The following program illustrates this:

```
10 osnewl=&FFE7:oswrch=&FFEE
20 osbyte=&FFF4:escape=&FF
30 DIM C%100:FOR L%=0TO2STEP2
40 P%=C%:[OPT L%:.start
50  BIT escape:BPL adval:RTS
60 .adval
70  LDA #128:LDX #1
80  LDY #0:JSR osbyte
90  TYA:LSRA:LSRA:LSRA:LSRA
100  LDX #32:CMP #0:BCC skip1
110  SBC #10:LDX #ASC("1")
120 .skip1
130  PHA:TXA:JSR oswrch:PLA
140  ORA #&30:JSR oswrch
150  JSR osnewl:JMP start
160 ]:NEXT:CALL start
```

Confessions of a faint-hearted Micro User

Corridors of power

Dear Trev,

These nightschool computer classes are getting better and I'm learning a lot. Mind you, not much of it's about micros.

I really think that the problem lies with Ludwig the lecturer – he of the eye patch and fixed ideas. He got off to a bad start when he decided to do machine code straight away.

"This will sort out the men from the boys", he announced, giving Doreen a singularly puzzled look. (Actually it's Doreen who sorts out the men from the boys – and I'm just one of the lads.)

"We'll start of with addressing techniques. You can call me Sir".

That was one of Ludwig's Little Jokes. Apparently the mark you get in the exam is directly proportional to how hard you laugh plus a few for any stray roms that end up on his desk.

"No, seriously, what do you know about addressing techniques?"

"Always use the post code", I blurted out before I could stop myself. I spent the rest of the evening in the corridor hoping passersby just thought I was resting from a case of programmer's cramp.

As it was I missed the moment where, after assembling some code, he started to disassemble. He was interrupted by Doreen saying that if that was what he was doing, why waste time assembling it in the first place?

As the evening progressed, the corridor got quite crowded and eventually Ludwig declared an amnesty, claiming he'd turn a blind eye to our indiscretions, just this once.

It was owing to this that I managed to be in class when he started on Pascal. I was better off in the corridor. At least before he started I knew that I didn't know Pascal. Now I have my doubts about Basic as well.

All I really remember is that it has no line numbers and that's because I had Clive next to me going through Basic withdrawal symptoms. "I need a line number. Go on, just one line number, I'll stop using them after that", he whimpered.

Mind you, things might have been a bit better if he'd been using beebs like the rest of us. As it was he stuck to his own favourite micro, justifying it by saying that it was "An Apple for the teacher". It was then that I remembered where I'd first seen Ludwig. He'd come to the Rogues to give us a lecture on Interrupts but the lads kept asking him questions, not letting him get started.

Still, if things were bad, they got worse when Ludwig decided to go into recursion. Over and over again.

And, for those who weren't totally confused, he decided to teach us reverse Polish notation or Hsilop as he called it. He said he wouldn't be satisfied until we knew it backwards.

All I know is that it's a method of making difficult sums even more difficult but computers like it. And it's used in stack-based, maths-orientated languages like Forth. I'm afraid I missed the rest of that lecture as Ludwig took my remark "Go Forth and multiply" personally and I ended up out in the corridor again.

I didn't miss much according to the others. Doreen says Ludwig isn't a patch on the other lecturers she's had.

Cheers, **Bob**

PS: Joy! Doreen's found out that Pascal has a GOTO. Just wait till I see Ludwig!

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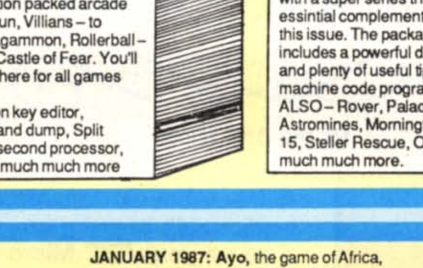

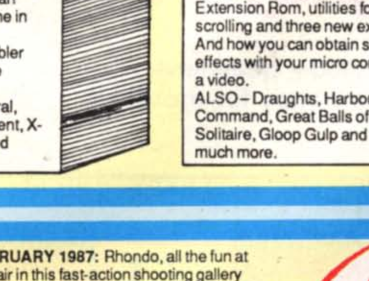

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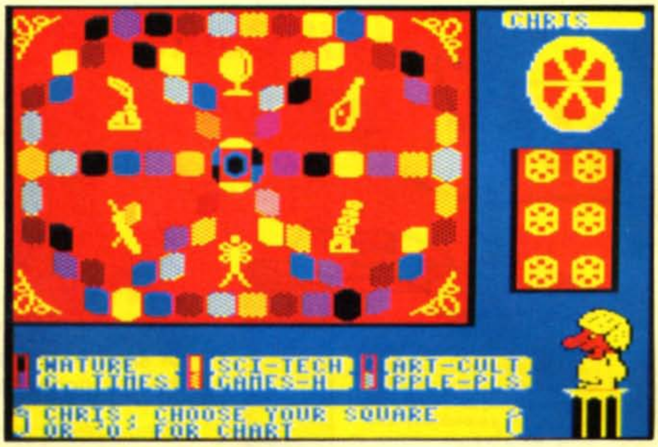

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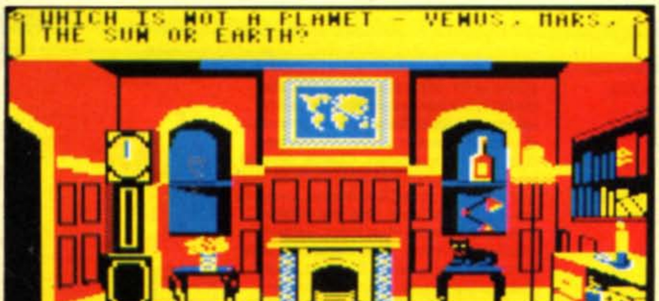

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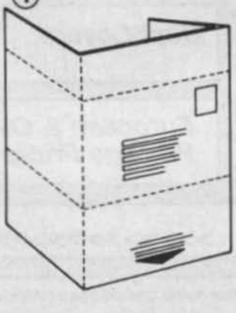

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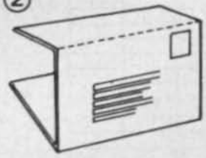

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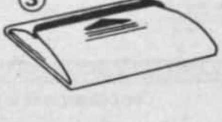

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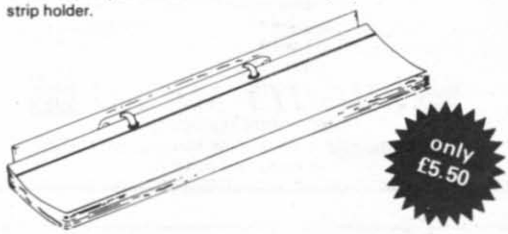

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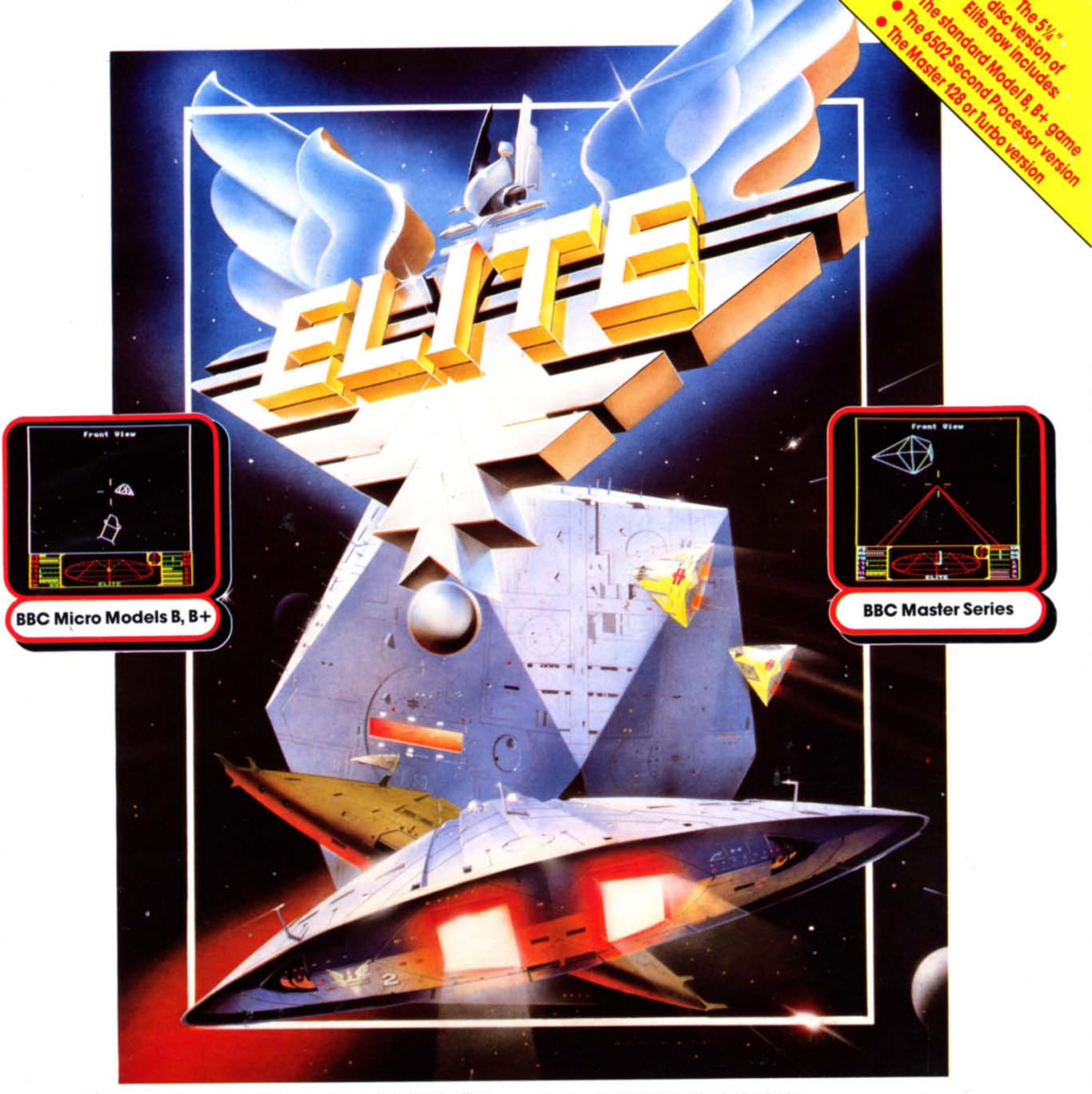

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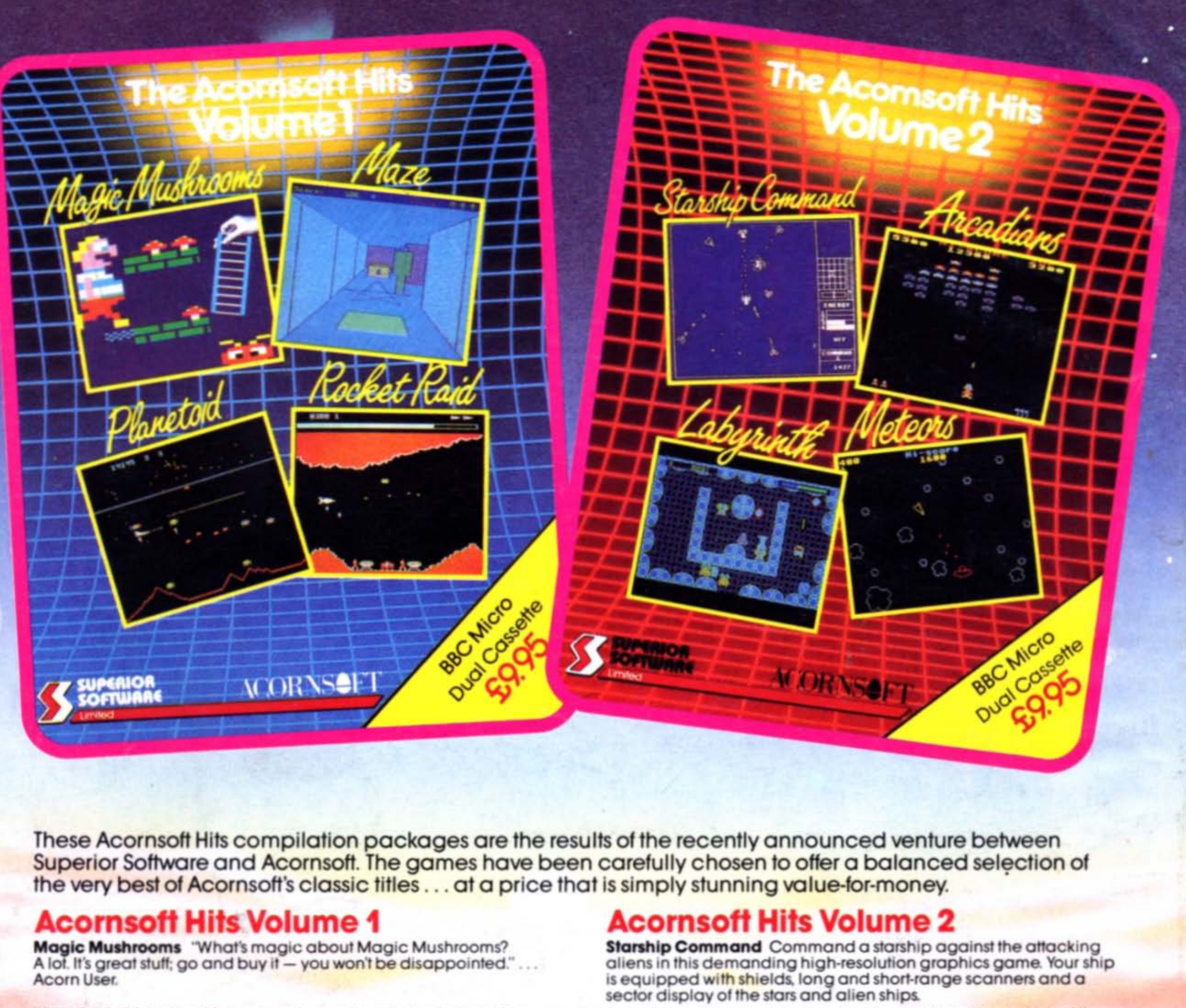
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